

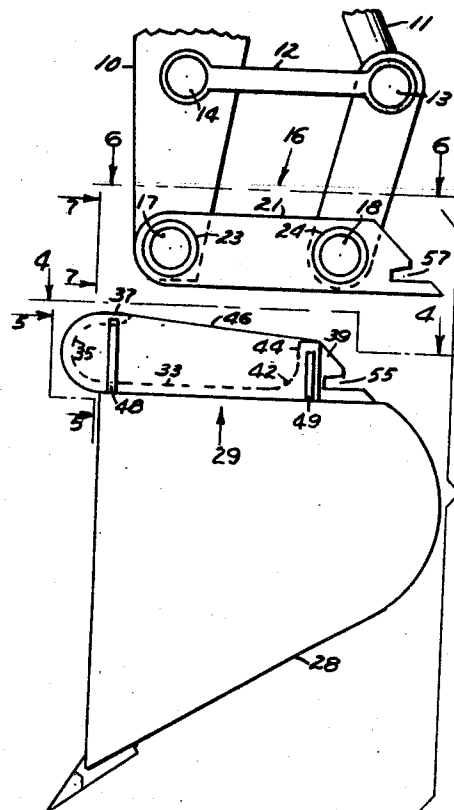
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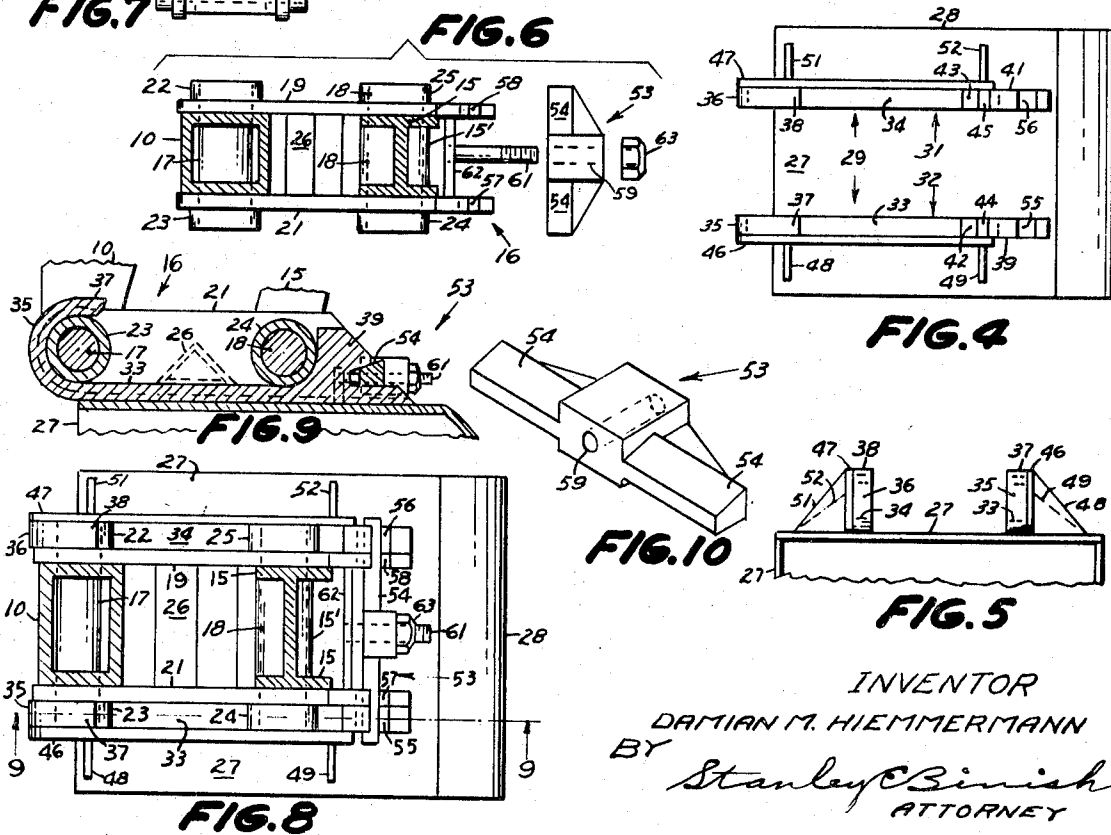
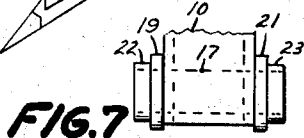
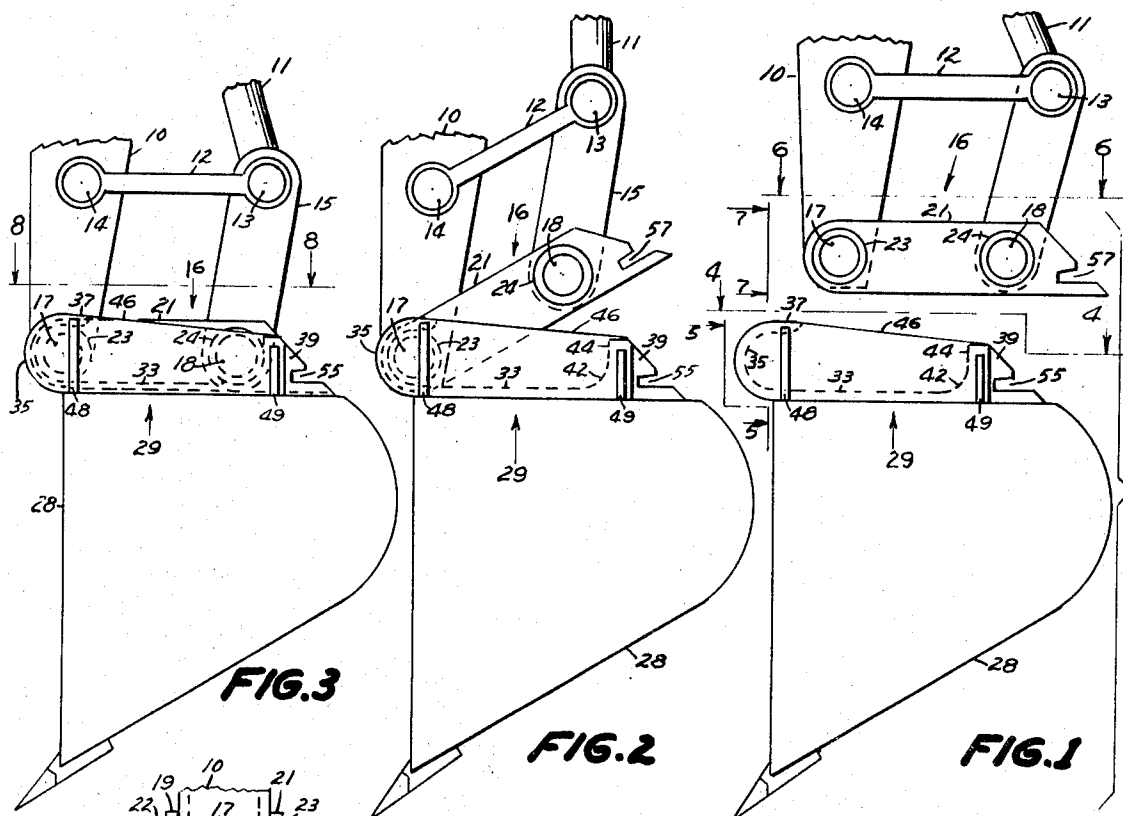
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[54] **QUICK-CONNECT COUPLER FOR BUCKET ON
EXCAVATING MACHINE**
5 Claims, 10 Drawing Figs.

[52] U.S. Cl. 214/145,
214/138
[51] Int. Cl. E02f 3/81
[50] Field of Search. 214/145,
138, 131; 37/118, 103, 117.5

ABSTRACT: A quick-connect coupling means for effecting a rapid change over from a one size bucket to a different size bucket on the dipper stick of an excavating machine such as a backhoe, or the like, comprising a pair of superimposable complementary parts hookedly engageable, and lockable by means of a lock bar operatively movable laterally of said coupling means.





QUICK-CONNECT COUPLER FOR BUCKET ON EXCAVATING MACHINE

In the field of excavation, there are numerous times when a contractor could save considerable time and money by changing to a smaller size bucket and dig a narrower trench, but is reluctant to do so because of the prolonged time and difficulty involved in attaching and detaching buckets coupled to the dipper stick by the conventional pin coupling means. Many of such conventional coupling means require bruised pins to be driven out, and bores to be patiently aligned. The present invention provides coupling means whereby a bucket can be changed quickly and easily, there being no pins to be driven, no bores to be aligned, and the operator can initially seat and mate the complementary parts of the coupling from his station at the operating controls of the excavating machine.

Some characteristic features of this invention are the provision of coupler means, for coupling an excavating bucket to the dipper stick of an excavating machine, comprising a pair of superimposable and hookedly engageable mating parts mounted on said bucket and dipper stick; the provision of coupling means for detachably securing an excavating bucket to the dipper stick of an excavating machine and locking said coupling means by means of a lock bar operatively movable laterally of said coupling means; and the provision of coupling means comprising saddle means on an excavating bucket for hookedly receiving, from above, a complementary yoke means mounted on the dipper stick of an excavating machine, said saddle and yoke means being detachably engaged by means of a lock bar operatively movable sidewise and laterally of said coupling means.

Other specific features and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the FIGS. thereof and wherein:

FIG. 1 is a side elevation view of the present invention showing the dipper stick and attached yoke poised above the bucket and saddle thereon in readiness for the seating of the yoke means in the saddle means;

FIG. 2 is a side elevation view showing the yoke disposed declined relative to the saddle, and the lower forward portion of the yoke being received in the forward hook portion of the saddle;

FIG. 3 is a side elevation view showing the horizontally disposed yoke fully seated in the saddle, fore and aft;

FIG. 4 is a plan view of the bucket and saddle taken on line 4-4 of FIG. 1;

FIG. 5 is a fragmentary front elevation view of the bucket and saddle taken on line 5-5 of FIG. 1;

FIG. 6 is a fragmentary section view of the yoke on the dipper stick taken on line 6-6 of FIG. 1, and showing a lock bar space related thereto;

FIG. 7 is a fragmentary front elevation view of the yoke taken on line 7-7 of FIG. 1;

FIG. 8 is a plan view taken on line 8-8 of FIG. 3, and showing the inclusion of the lock bar securing the yoke to the saddle;

FIG. 9 is a fragmentary section view taken on line 9-9 of FIG. 8; and

FIG. 10 is a perspective view of the lock bar, per se.

Referring now to the drawings wherein like reference numerals designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a dipper stick 10 of an excavating machine such as a back hoe, not shown. While the present invention is applicable to excavating machines of the bucket type generally, the following describes its application to a back hoe in particular. Pivotaly mounted on the front face of said dipper stick is a reciprocable bucket tilt ram means 11. Spacer link means 12 is pivotaly connected to the free end of said hydraulic ram means 11 by pin 13, and to the dipper stick by pin 14.

A control link 15 is pivotaly mounted at one end on ram pin 13. Said control link 15 comprises an intermediate H-section member having sleeve bearings such as indicated at 15' welded on each end thereof to receive yoke pin 18 therethrough.

A frame or yoke means, generally indicated at 16, is pivotaly mounted at its rearward end to the end portion of the dipper stick, by means of transverse pin 17. The forward end portion of the yoke means is pivotaly mounted to the free end of control link 15 by means of pin 18. Normally, said yoke means is disposed at right angle to said dipper stick, and is pivotal upwardly and downwardly therefrom, about pin 17, by means of ram 11 and control link 15.

Said yoke means comprises a pair of parallel side links 19 and 21 disposed on opposite sides of the dipper stick 10 and of the control link 15, and are pivotaly connected to the aforesaid yoke pins 17 and 18, respectively.

Yoke pin 17 extends transversely through the end portion of the dipper stick and extends beyond the sides thereof to pivotaly engage the side links 19 and 21 adjacent thereto, and extends further therebeyond into and through collar trunnions 22 and 23 mounted on the outside faces of said side links as by welding. Obviously, said collar trunnions may be mounted on said pin as an enlargement or journal thereof, in lieu of being mounted on said links. In the alternative, said pin may be of a larger more suitable diameter.

Yoke pin 18, parallel to yoke pin 17, is likewise extended to pivotaly engage the other ends of said side links 19 and 21, and further extended into and through collar trunnions 24 and 25 mounted on the outside faces of said side links as by welding. Obviously, said collar trunnions 24 and 25 may be mounted on said pin 17 as an enlargement or journal thereof, in lieu of being welded on said links. In the alternative, said pin may be of a larger more suitable diameter.

Triangular cross-brace means 26 is welded across the side links 19 and 21, intermediate the ends thereof, to strengthen and provide rigidity to the yoke structure.

To engageably receive said frame or yoke 16, there is provided, on the top plate 27 of associated excavating bucket 28, a twin saddle means generally indicated at 29.

Said saddle means comprises a pair of upstanding parallel runner or saddle shaped elements 31 and 32 secured to the top plate 27 of bucket 28 as by welding. Said saddle elements are substantially identical in size and shape and are oppositely disposed and spaced to receive the side plates 19 and 21 of yoke 16, nested adjacently therebetween in a working fit.

Said runners or saddle elements comprise elongated horizontal barlike central body portions 33 and 34, see FIGS. 1, 2 and 9, having upwardly bent-back, hooked or recurved head end portions 35 and 36 as extensions of said barlike central body portions, to snugly receive and seat said journals or collar trunnions 22 and 23 in said hook ends or cradles respectively. Said recurvate portions are recurved 180° and provided with small tangent extensions 37 and 38, respectively.

The other ends of said barlike body portions terminate in upstanding tail portions 39 and 41, see FIGS. 1, 2 and 9, having interconnecting 90° upwardly curved seats 42 and 43, and small tangent extensions 44 and 45, thereof, to snugly receive and seat collar trunnions 24 and 25 on said curved seats, respectively. Said upwardly curved seats also serve as abutments to resist any thrust or lateral pressure thereagainst by said collar trunnions 24 and 25.

Said runner or saddle elements are disposed, on the top of the bucket, symmetrically about the longitudinal centerline, front to back, of the bucket; the recurved portions of said saddle elements being disposed at the front or open face of the bucket.

Reinforcing plates 46 and 47, see FIGS. 4 and 5, are welded to the outer faces of saddle elements 33 and 34 to strengthen the hook ends 35 and 36, respectively.

Said reinforcing plates are further buttressed by means of gusset brackets 48 and 49, and 51 and 52, at the outer faces of said plates, respectively, and secured to the top of said bucket and to said reinforcing plates as by welding.

A lock bar, generally indicated at 53, see FIGS. 9 and 10, is provided to link, lock, or join the yoke to the saddle means and thereby couple the bucket to the dipper stick.

Said lock bar is slightly wedge shaped, as by inclined surface 54, and is seatably received, sidewise or laterally, see FIGS. 1 and 4, in corresponding and oppositely disposed slots 55 and 56 in the tail end edge portions of saddle elements 33 and 34, respectively, said slots being laterally aligned and in registry when the yoke is fully seated in the saddle means as hereinafter described.

Said lock bar is provided with a central bore 59 to receive a threaded stud 61 fixed to a crossbar 62 welded across yoke side links 19 and 21 forwardly of said slots. The lock bar is drawn seated tightly in said slots by means of nut 63 threadedly engaged with said stud.

Operation:

Assuming that an operator desires to disconnect a bucket from the excavating machine, he rests the bucket on the ground and may support it in an upright position, such as shown in FIG. 3, by means of blocks or the like. He then manually backs off the nut 63 from stud 61 and laterally withdraws the lock bar 53 from slots 55, 56, and 57, 58. This unlocks the yoke from the saddle means.

The operator then mounts the machine and returns to his operating station at the machine controls.

He then manipulates the controls to actuate ram 11 upwardly, which through connecting link 15 communicates an upward rotative motion to yoke 16, said yoke pivoting about pin 17. Such movement unseats collar trunnions 24 and 25 from corresponding arcuate seats 42 and 43, respectively, and otherwise raises such trunnions sufficiently to clear the tail end portions of the saddle elements, as shown in FIG. 2.

The operator then manipulates the controls to actuate the dipper stick to withdraw the journals or collar trunnions 22 and 23 sidewise or laterally out of engagement with cradle or hook elements 36 and 35, respectively, and further lifts the yoke upwardly to fully disengage the yoke from the saddle means and dispose it free and clear above the saddle means as shown in FIG. 1.

To couple a bucket to the excavating machine, the above operative steps are reversed. That is, assuming the dipper stick and yoke are poised above the bucket and saddle means thereon, as shown in FIG. 1, the operator then manipulates the controls to actuate ram 11 to pivot the yoke angularly upwardly and then lowers the dipper stick and moves the journals or collar trunnions 22 and 23 sidewise or laterally into seating engagement with saddle hook elements or cradles 36 and 35, respectively, as shown in FIG. 2.

The operator then manipulates the controls to actuate the ram downwardly which causes collar trunnions 24 and 25 to seat on corresponding arcuate seats 42 and 43, respectively. In the event such trunnions initially engage the tangent extensions 44 and 45, such engagement and downward movement tends to force and cam the collar trunnions 22 and 23 positively into their associated hook elements 36 and 35, respectively, and guide trunnions 24 and 25 into their associated seats.

The lock bar 53 is then manually inserted onto stud 61, and advanced laterally into aligned and registered slots 55, 56 and 57, 58 and drawn tightly therein by means of nut 63, thereby coupling and locking the bucket on the dipper stick.

Among the novel features of this invention is the provision of a coupler means for quick-connecting a bucket to a dipper stick of an excavating machine said coupler comprising a frame or yoke means on said dipper stick directly superimposable and seatable from above on saddle means mounted on said bucket, said yoke and saddle means being locked together by a lock bar operatively movable sidewise and laterally of said coupler means.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. In a backhoe excavating machine having a dipper stick, a bucket, and coupling means for coupling said bucket to said dipper stick, said coupling means including yoke means mounted on the lower end portion of said dipper stick and complementary saddle means mounted on the top side of said bucket, said coupling means comprising:

- a. a first yoke pin mounted on and disposed transversely across the lower end portion of said dipper stick, said first yoke pin extending beyond the side faces of said dipper stick;
- b. side links pivotally mounted on said first yoke pin extensions, respectively, said side links being spaced from the ends of said first yoke pin thereby defining first pin free end portions, and said side links being normally disposed substantially at right angle to said dipper stick and extending forwardly thereof;
- c. first collar trunnions on said first pin free end portions, respectively;
- d. means for fixing said first collar trunnions on the adjacent faces of said side links, respectively;
- e. a second yoke pin mounted on and across the free end portions of said side links, said second yoke pin being disposed parallel to said first yoke pin, and said second yoke pin extending beyond the side faces of said side links thereby defining second pin free end portions;
- f. second collar trunnions on said second pin free end portions, respectively;
- g. means for fixing said second collar trunnions on the adjacent faces of said side links, respectively;
- h. first oppositely disposed slots in the end edge portions of said free end portions of said side links, respectively, for laterally receiving a lock bar;
- i. cross-brace means for rigidly interconnecting said side links;
- j. control link means pivotally mounted, at one end, on said second yoke pin, intermediate said side links, and extending normally upwardly and substantially parallel to said dipper stick;
- k. spacer link means pivotally interconnecting the free end portion of said control link means and said dipper stick, said spacer link being normally substantially at right angle to said dipper stick;
- l. ram means on said dipper stick pivotally connected to said control link for actuating said control link;
- m. a pair of similar spaced parallel saddle elements mounted longitudinally on the top side of said bucket, said saddle elements having barlike central body portions terminating at one end in upstanding oppositely disposed substantially 180° recurved hook ends to receive and snugly seat said first collar trunnions, respectively, said hook ends being disposed at the open end of the rearwardly facing bucket, and the other end of said barlike central body portions terminating in substantially 90° upwardly curved seats to snugly receive said second collar trunnions, respectively, when said first collar trunnions are operatively seated in said hook ends, said 90° curved seats being formed in upstanding tail portions extending from said barlike body portions, respectively, and said saddle elements being spaced apart a distance to receive said side links therebetween in a working fit;
- n. second oppositely disposed slots in the end edge portions of said tail portions for laterally receiving a lock bar, said slots being disposed aligned with said first slots when said first and second collar trunnions are operatively seated in said hook ends and 90° upwardly curved seats, respectively;
- o. a lock bar received in said first and second slots when said slots are operatively aligned; and
- p. means for securing said lock bar in said aligned slots.

2. In an excavating machine having a dipper stick, a bucket, and coupling means for coupling said bucket to said dipper stick, said coupling means including yoke means mounted on the lower end portion of said dipper stick and complementary

saddle means mounted on the top side of said bucket, said coupling means comprising:

- a. a first yoke pin means mounted on and disposed laterally of the lower end portion of said dipper stick, said pin means extending outwardly of the sides of said dipper stick thereby defining first yoke trunnions;
 - b. side link means pivotally mounted on said first yoke pin means, said side link means being normally disposed substantially at right angle to said dipper stick;
 - c. first slot means in the free end edge portions of said side link means for receiving a lock bar sidewise therein;
 - d. second yoke pin means mounted on the free end portion of said side link means and being disposed parallel to said first yoke pin means, said second yoke pin means extending outwardly of the sides of said side link means thereby defining second yoke trunnions;
 - e. control link means pivotally mounted on said second yoke pin means and normally extending upwardly therefrom;
 - f. spacer link means pivotally interconnecting the free end portion of said control link means and said dipper stick, said spacer link means being disposed upwardly of said side link means;
 - g. drive means connected to said control link for actuating said control link;
 - h. saddle means mounted longitudinally on the top side of said bucket, said saddle means having central body means terminating at one end in a pair of spaced upstanding oppositely disposed substantially 180° recurved hook ends for receiving and seating said first yoke trunnions, respectively, and the other end of said central body means terminating in a pair of spaced upstanding oppositely disposed substantially 90° upwardly curved seats to receive said second yoke trunnions, respectively, when said first yoke trunnions are operatively seated in said hook ends, said 90° curved seats being formed in tail portions extending from said central body means;
 - i. second slot means in the end edge portions of said tail portions for receiving a lock bar sidewise therein, said second slot means being disposed aligned with said first slot means when said first and second yoke trunnions are operatively seated in said hook ends and 90° curved seats, respectively;
 - j. a lock bar received in said first and second slot means when said slot means are operatively aligned; and
 - k. means for securing said lock bar in said aligned slots.
3. In an excavating machine having a dipper stick, a bucket, and coupling means for coupling said bucket to said dipper stick, said coupling means including yoke means mounted on the lower end portion of said dipper stick and complementary saddle means mounted on the top of said bucket, said coupling means comprising:
- a. a first yoke pin means mounted on and disposed laterally of the lower end portion of said dipper stick, said first pin means having first journal means thereon;
 - b. side link means pivotally mounted on said first yoke pin means, said side link means being normally disposed substantially at right angle to said dipper stick;
 - c. first slot means in the free end edge portions of said side link means for receiving a lock bar therein;
 - d. second yoke pin means mounted on the free end portion of said side link means and being disposed parallel to said first yoke pin means, said second yoke pin means having second journal means thereon;
 - e. control link means pivotally mounted on said second yoke pin means and normally extending upwardly therefrom;
 - f. spacer link means pivotally interconnecting the free end portion of said control link means and said dipper stick, said spacer link being disposed upwardly of said side link means;
 - g. drive means for actuating said control link;

- h. saddle means mounted on the top side of said bucket, said saddle means having central body means terminating at one end in upstanding hook means for receiving and snugly seating said first journal means, said hook means being recurved between 90° and 180°, and the other end of said central body means terminating in an upwardly curved seat for snugly receiving said second journal means when said first journal means is operatively seated in said hook means, said curved seat being formed in a tail portion extending from said central body means;
 - i. second slot means in the end edge portion of said tail portion for receiving a lock bar sidewise therein, said second slot means being disposed aligned with said first slot means when said first and second journal means are operatively seated in said hook means and curved seat, respectively;
 - j. a lock bar received in said first and second slot means when said slots are aligned; and
 - k. means for securing said lock bar in said aligned slots.
4. In an excavating machine having a dipper stick, a bucket, and coupling means for coupling said bucket to said dipper stick, said coupling means including yoke means mounted on the lower end portion of said dipper stick and complementary saddle means mounted on the top of said bucket, said coupling means comprising:
- a. a first yoke pin means mounted on and disposed laterally of the lower end portion of said dipper stick, said first pin means having journal means thereon;
 - b. side link means pivotally mounted on said first yoke pin means, said side link means normally extending substantially laterally of said dipper stick;
 - c. first slot means in the free end portions of said side link means for receiving a lock bar therein;
 - d. second yoke pin means mounted on the free end portion of said side link means and being disposed parallel to said first yoke pin means;
 - e. control link means pivotally mounted on said second yoke pin means and normally extending upwardly therefrom;
 - f. spacer link means pivotally interconnecting the free end portion of said control link means and said dipper stick, said spacer link being disposed upwardly of said side link means;
 - g. drive means for actuating said control link;
 - h. saddle means mounted on the top side of said bucket, said saddle means having central body means terminating at one end in upstanding recurved hook means for laterally receiving and snugly seating said journal, and the other end portion of said central body means having seat means to receive and seat said second yoke pin means when said journal means is operatively seated in said hook means said seat means including abutment means engageable with said second yoke pin means to resist lateral pressure by said second yoke pin means;
 - i. second slot means in the end portion of said other end of said central body means, said second slot means being disposed aligned with said first slot means when said journal and second yoke pin means are operatively seated in said hook means and on said central body means, respectively;
 - j. a lock bar received in said first and second slot means when said slots are aligned; and
 - k. means for securing said lock bar in said aligned slots.
5. In an excavating machine having a dipper stick, a bucket, and coupling means for coupling said bucket to said dipper stick, said coupling means including yoke means mounted on the lower end portion of said dipper stick and complementary saddle means mounted on the top of said bucket, said coupling means comprising:
- a. a first yoke pin means mounted on and disposed laterally of the lower end portion of said dipper stick, said first pin means having journal means thereon;

- b. side link means pivotally mounted on said first yoke pin means, said side link means normally extending substantially laterally of said dipper stick;
- c. second yoke pin means mounted on the end portion of said side link means and being disposed parallel to said first yoke pin means;
- d. control link means pivotally mounted on said second yoke pin means and normally extending upwardly therefrom;
- e. spacer link means pivotally interconnecting the free end portion of said control link means and said dipper stick, said spacer link being disposed upwardly of said side link means;

- f. drive means for actuating said control link;
- g. saddle means mounted on the top side of said bucket, said saddle means having central body means terminating at one end in upstanding recurved hook means, for receiving and snugly seating said journal means, and the other end portion of said central body means having seat means to receive said second yoke pin means when said journal means is operatively seated in said hook means; and
- h. means for rigidly connecting said side link means and saddle means when said journal means and second yoke pin means are operatively seated in said hook means and on said seat means, respectively.

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