



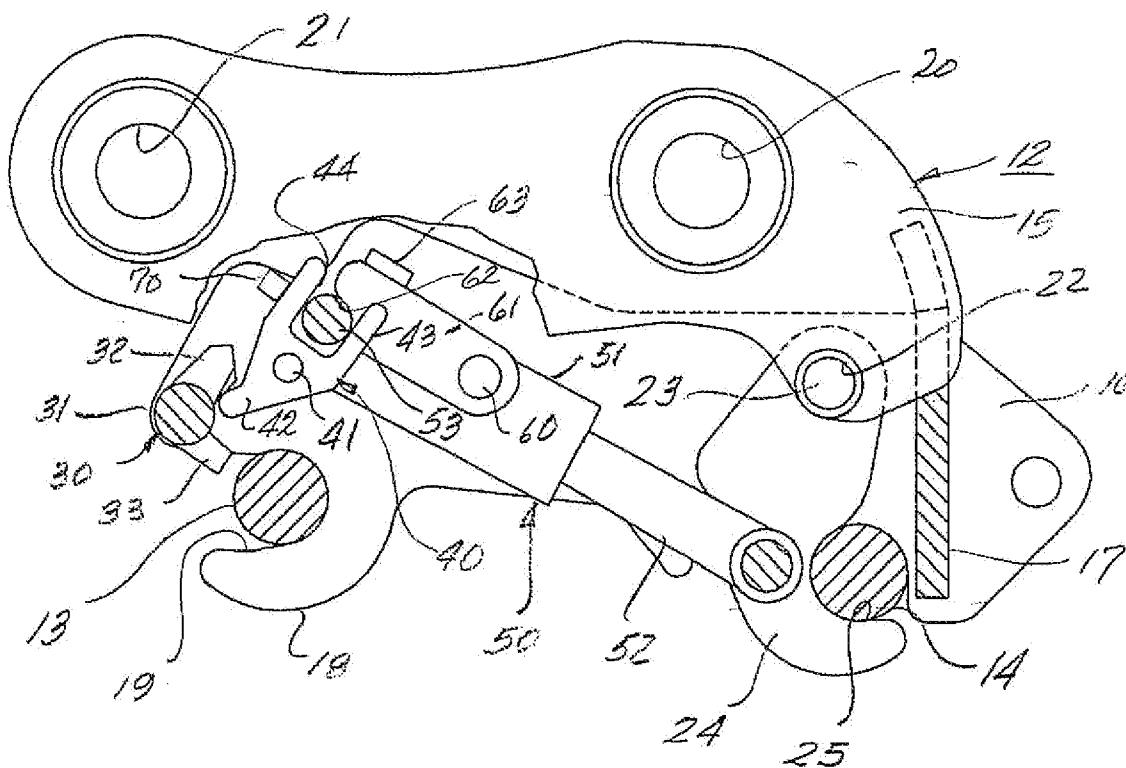
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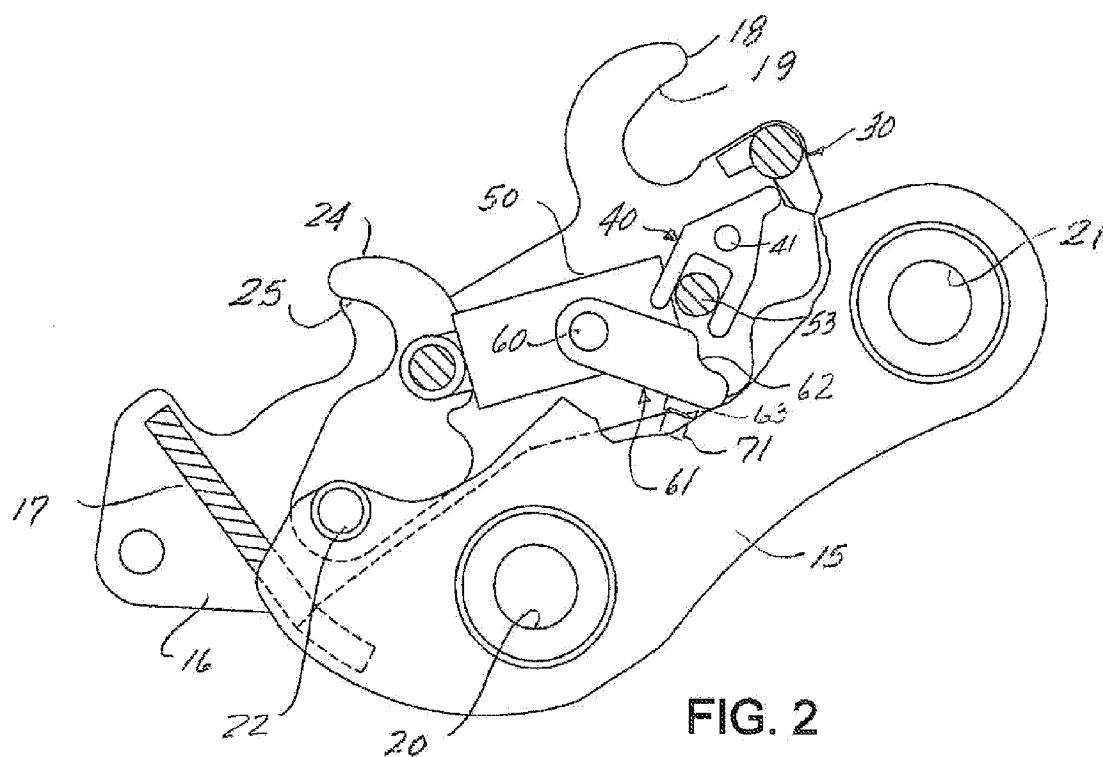
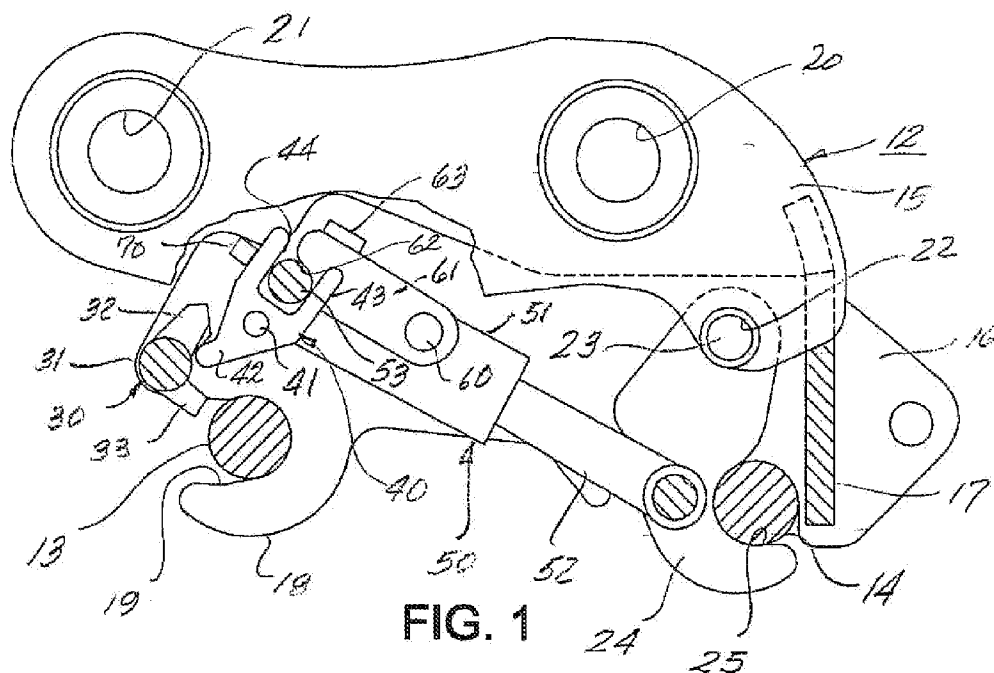
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PRUSZYNSKI(10) **Pub. No.: US 2009/0282712 A1**(43) **Pub. Date: Nov. 19, 2009**(54) **COUPLER FOR EXCAVATING MACHINES
AND THE LIKE**(52) **U.S. Cl. 37/468**(76) **Inventor: Edwin PRUSZYNSKI, Bedford,
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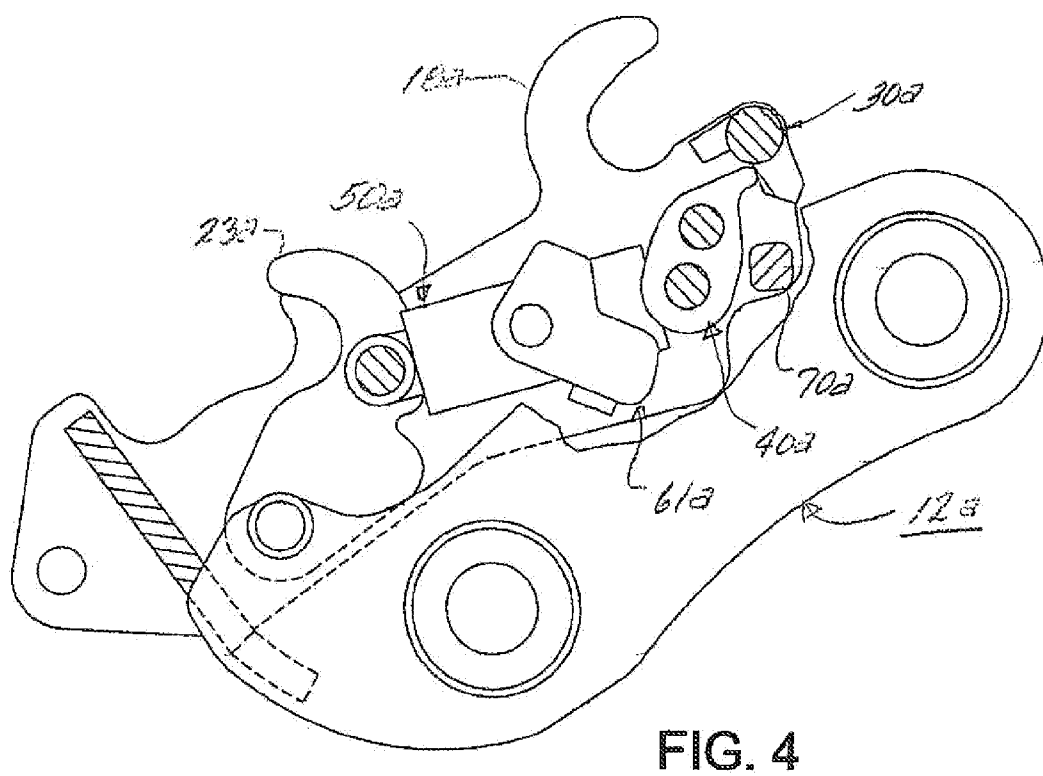
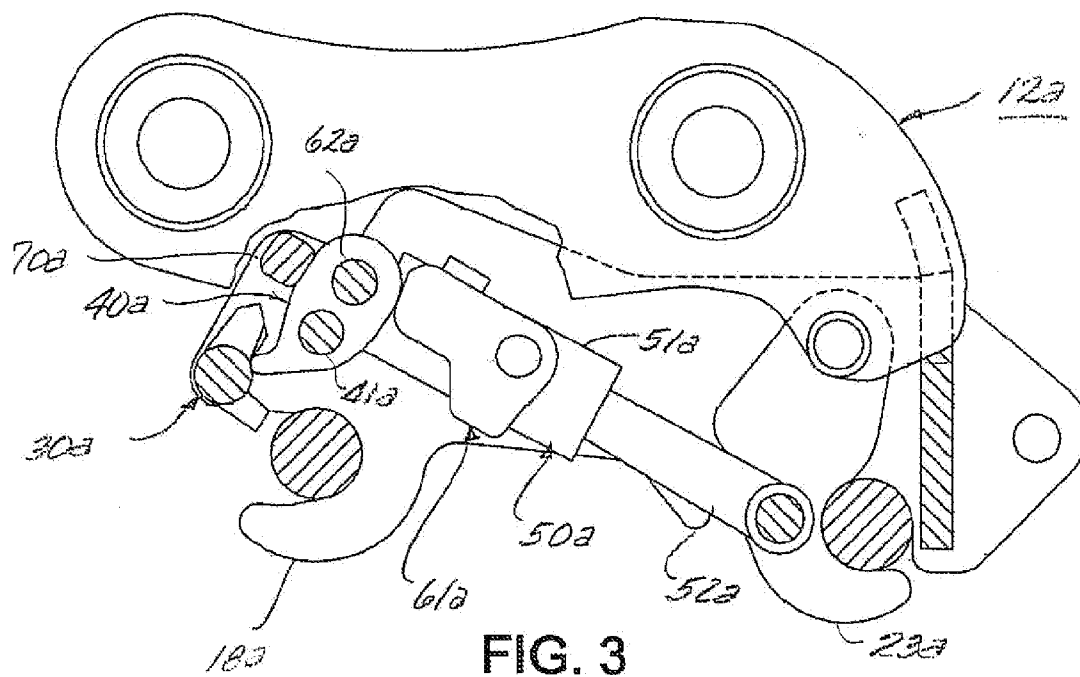
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E02F 9/00 (2006.01)(57) **ABSTRACT**

A coupler mountable on the dipper stick and tilt assembly of a machine including a body provided with a fixed jaw and a pivotal jaw connectable to the mounting pins of an implement; a stop latch pivotally connected to the body, biased in a first position obstructing the removal of a mounting pin disposed in the fixed jaw; a latch cam pivotally connected to the body engageable with the stop latch for pivoting the stop latch upon pivoting the latch cam; a fluid actuated cylinder assembly operative interconnecting the latch cam and the pivotal jaw; and means of cooperation with the cylinder assembly and the latch cam, functional to preclude pivotal movement of the latch cam when the body is disposed in a first orientation, and to permit pivotal movement of the latch cam when the body is disposed in a second orientation.







COUPLER FOR EXCAVATING MACHINES AND THE LIKE

[0001] This invention relates to a coupler and more particularly to a coupler mountable on the dipper stick of an earth working machine such as an excavator machine, for detachably mounting various implements.

BACKGROUND OF THE INVENTION

[0002] In the prior art, there has been developed a type of coupler that is adapted to be mounted on the dipper stick of an earth working machine, which is used to detachably connect various implements such as buckets, grapples, rakes and the like. Such couplers typically consist of a body mountable on the dipper stick and tilt assembly of a machine, and include a pair of jaws engageable with a pair of mounting pins provided on an implement to be connected to the machine. At least one of such jaws is pivotally mounted on the coupler to permit the coupler to be manipulated relative to the implement and connected thereto by means of the jaws engaging the mounting pins. Normally, one or both of such jaws is pivoted into and out of engagement with one or both mounting pins of an implement by means of a fluid actuated cylinder assembly.

[0003] In the use of the type of coupler described, utilizing a cylinder assembly for pivoting one or both of the connecting jaws, there is always the possibility through equipment malfunction or operator error for a cylinder assembly intended to maintain a movable jaw into engagement with a mounting pin of an implement, to lose pressure or otherwise be operated and thus be caused to disconnect from the dipper stick and possibly fall or otherwise displace, possibly causing injury to personnel and/or damage to property. Because of such a possibility, it is the principal object of the present invention to provide a coupler of the general type described, which is not prone to disconnect upon equipment malfunction or operator error, and which can be disconnected only upon certain intended action on the part of the operator.

SUMMARY OF THE INVENTION

[0004] The principal object of the present invention is achieved by means of a coupler mountable on a dipper stick and tilt assembly of a machine, and detachably connectable to an implement having a pair of spaced, substantially parallel mounting pins, generally consisting of a body having means for pivotally connecting the body to a dipper stick, means for pivotally connecting the body to the tilt assembly wherein upon operation of the tilt assembly the body will be caused to pivot about the dipper stick, a fixed jaw having an opening for receiving a mounting pin of the implement and a pivotally connected jaw having an opening or receiving the other of the mounting pins; a stop latch pivotally connected to the body, having a first arm section biased in a first position obstructing the opening in the fixed jaw; a latch cam pivotally connected to the body having a first arm section engageable with an arm section of the stop latch for pivoting the stop latch upon pivoting the latch cam; a fluid actuated cylinder assembly having one of the cylinder and rod members thereof pivotally connected to a second arm section of the latch cam and the other of the cylinder and rod members pivotally connected to the pivotal jaw for pivotal movement of the pivotal jaw upon displacement of the cylinder assembly; and means cooperable with the cylinder assembly and the latch cam, functional

to preclude pivotal movement of the latch cam when the body is disposed in a first orientation, and to permit pivotal movement of the latch cam when the body is disposed in a second orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a side elevational view of an embodiment of the invention, disposed in an upright orientation, having a portion thereof broken away;

[0006] FIG. 2 is a side elevational view of the embodiment shown in FIG. 1, disposed in an inverted orientation;

[0007] FIG. 3 is a side elevational view of another embodiment of the invention, disposed in an upright orientation, having a portion thereof broken away; and

[0008] FIG. 4 is a side elevational view of the embodiment shown in FIG. 4, disposed in an inverted orientation, having a portion thereof broken away.

DETAILED DESCRIPTION OF THE PREFERRED OF THE INVENTION

[0009] Referring to FIGS. 1 and 2 of the drawings, there is illustrated a coupler **12** adapted to be connected to the dipper stick and tilting assembly of a machine such as an excavator machine (not shown), and detachably connected to an implement (not shown) having a pair of spaced, parallel mounting pins **13** and **14**. Coupler **12** includes a pair of longitudinally disposed, transversely spaced side plates **15** and **16** rigidly interconnected by means of a number of members including plate **17** disposed at one end thereof. The lower, rear ends of side plates **15** and **16** are formed as fixed jaws **18, 18** with rearwardly facing openings **19, 19** which are adapted to receive mounting pin **13** of the implement to be detachably connected to the coupler. The upper front end portions of side plates **15** and **16** are provided with a transversely extending openings **20, 20**. The upper rear end portions of side plates **15** and **16** are provided with transversely disposed openings **21, 21**. The front end of coupler **12** is adapted to be pivotally connected to a dipper stick by means of a pin inserted through openings **20, 20** and a similar opening in the dipper stick. Similarly, the rear end of the coupler is adapted to be pivotally connected to a link of the tilt assembly of the machine by means of a pin inserted through openings **21, 21** in the side plates of the coupler and a registered opening in the connecting link of the tilt assembly. The forward ends of side plates **15** and **16** further are provided with a pair of transversely aligned openings **22, 22** in which there is received a pin **23**. Pivotally connected to pin **23** between side plates **15** and **16** is a jaw **24** having a forwardly facing opening **25**.

[0010] Provided on the rearward end of the coupler body is a stop latch **30** consisting of a transversely disposed shaft section **31** journaled in aligned openings in the side walls provided with a first pair of radially disposed, transversely spaced arm sections **32, 32** and a pair of radially disposed, transversely spaced arm sections **33, 33** angularly displaced relative to arm sections **32, 32** with respect to the axis of shaft section **30**. Interconnecting the coupler body and stop latch **30, 30** is a spring which urges the stop latch in the position as shown in FIG. 1 with arm sections **33, 33** disposed in the upper end of openings **19, 19** to preclude the removal of a mounting pin **13** from openings **19, 19** from jaws **18, 18**. Mounted just ahead of stop latch **30** is a latch cam **40** consisting of a shaft section **41** journaled in aligned openings in the side walls, provided with a pair of radially disposed,

transversely spaced arm sections 42, 42 engageable with arm sections 32, 32 of stop latch 30 and a pair of radially disposed transversely spaced arm sections 43, 43 angularly spaced relative to arm sections 42, 42 relative to the axis of shaft section 41. Each of arm sections 43, 43 is provided with a radially disposed slot 44.

[0011] Disposed between side plates 15 and 16 of the coupler body and extending substantially longitudinally therein is a fluid actuated cylinder assembly 50 consisting of a cylinder member 51 and an extendable rod member 52. The base of cylinder member 51 is provided with a transversely disposed pin 53 having transversely spaced portions thereof received in recesses 44, 44 of latch cams 40, 40. Rod member 52 is connected to a transversely disposed shaft 54 which is pivotally connected at its ends to pivotal jaws 24, 24 to permit the jaws to pivot as rod member 52 is extended and retracted in the conventional manner.

[0012] Provided on opposite sides of cylinder member 51 and aligned transversely is a pair of stub shafts 60, 60. Pivotally connected on each of shafts 60, 60 is a gravity latch 61 extending towards the base end of the cylinder member and having a notched portion 62 engaging shaft section 43. Gravity latches 61, 61 are interconnected by means of a transversely disposed member 63.

[0013] When the components of the coupler are positioned as shown in FIG. 1 with mounting pins 13 and 14 disposed in the openings of the fixed and pivotal jaws, the implement of mounting pins 13 and 14 will be firmly connected to the couplers permitting the coupler with the attached implement to be curled and uncurled by operation of the tilt assembly of the machine in the conventional manner. In the event of a retraction of rod member 52 by reason of a loss of pressure due to equipment malfunction or inadvertent operation of the operator, the rod member will retract, pivoting the pivotal jaw to an open position to release mounting pin 14 but due to the positioning of gravity latches 61, 61 in contact with shaft 62, latch cam 40 will be prevented from pivoting to permit stop latch 30 to pivot in a counterclockwise direction relative to FIG. 1 to remove arm sections 33, 33 from openings 19, 19 thus permitting mounting pin 13 to be removed from such openings. Under such circumstances, the coupler will remain attached to the implement by virtue mounting pin 13 remaining in openings 19, 19 of fix jaws 18, 18.

[0014] With the implement being connected to the coupler by reason of mounting pin 13 being disposed in the fixed jaws and prevented from being removed therefrom by stop latch 30, the implement may be detached from the coupler by operating the tilt cylinder assembly to curl the coupler with the attached implement to an inverted position as shown in FIG. 2, allowing gravity latch to pivot under the force of gravity to the position as shown in FIG. 2, and then applying pressure to the rod end of the cylinder to retract the cylinder. As the cylinder retracts and the movable jaws reach their rearward most positions, shaft 53 will cause latch cam 40 to pivot in a clockwise direction relative to FIG. 2 to correspondingly permit stop latch 30 to pivot in a counterclockwise direction, causing arm sections 33, 33 to be removed from openings 19, 19. Under such conditions mounting pin 13 may be freed of the coupler by manipulation of dipper stick and tilt assembly.

[0015] When it is desired to reconnect the implement or connect another implement having similar mounting pins, and the coupler is in the position as shown in FIG. 2, the tilt assembly is operated to pivot the coupler from the inverted

position as shown in FIG. 2 to the upright position as shown in FIG. 1. As the coupler is thus pivoted about the axis of connecting pin, gravity latches 61, 61 will pivot under the force of gravity from the position shown in FIG. 2 to the position as shown in FIG. 1. Under such conditions, stop latch 30 will be permitted to pivot in a counterclockwise direction against the biasing force imposed thereon but not in a clockwise direction due to the obstruction provided by latch cam 40. With the coupler thus configured, the dipper stick and tilt assembly of the machine may be operated to cause mounting pin 13 to trip stop latch 30 and be received in openings 19, 19 openings 25, 25 of pivotal jaws 24, 24 to be aligned with mounting pin 14 and rod member 52 be extended to receive mounting pin 14 in the openings of the pivotal jaws as shown in FIG. 1. Under such conditions, the implement will be firmly connected to coupler 12.

[0016] The pivotal movement of latch cam 40 in a counterclockwise direction with respect to FIG. 1 is precluded by a stop 70 secured to coupler side walls 15 and 16. As best seen in FIG. 2, the angular displacement of gravity latch 61 is limited by engagement of member 63 with a stop 71 also connected at its ends to coupler side walls 15 and 16. The dispositions and configurations of the various components including cylinder assembly 50, latch cam 40 and stop 71 are arranged so that when the coupler is in the upright orientation as shown in FIG. 1, gravity latch 61 will be in a position as shown in FIG. 1 engaging shaft 62 and preventing the movement of cylinder member 51 and when the coupler is in the inverted position as shown in FIG. 2, gravity latch 62 will be in the position as shown in FIG. 2 out of engagement with shaft 53, allowing the cylinder member to displace, and when the coupler is pivoted from the position as shown in FIG. 2 back to the upright position as shown in FIG. 1, the gravity latch will again engage shaft 53 to preclude the displacement of cylinder member 51. Typically, the coupler body and gravity latch 61 will be configured to restrict the pivotal displacement of the gravity latch within an angle of about 20°.

[0017] The embodiment shown in FIGS. 3 and 4 is similar in construction and operation to the construction and operation of the embodiment shown in FIGS. 1 and 2. The notable difference is in the configuration of latch cam 40a. In lieu of providing a recess which is adapted to receive a stud shaft mounted on the base end of the cylinder member latch cam 40a is pivotally mounted on a shaft 41a and further pivotally connected to a stub 53a mounted on the base end of the cylinder member. Pivotal movement of latch cam 40a in a counterclockwise direction with respect to FIG. 3 is precluded by a stop 70a. The configuration of gravity latch 61a also differs slightly from the configuration of gravity latch 61 in that the portion of such latch engaging latch cam 40a does not include a recessed portion as at 62 in the embodiment shown in FIG. 1. In all respects, however, the embodiment shown in FIGS. 3 and 4 operates in the same manner as the embodiment shown in FIGS. 1 and 2. Gravity latch 61a is positioned relative to the transverse axis of stub shafts 62a to preclude the pivotal movement of latch cam 40a in a clockwise direction relative to FIG. 3 when the gravity latch is in the position as shown in such Figure.

[0018] The embodiments of the invention as described not only provide a coupler that may be used to readily attach and detach various implements in performing various earth working operations but provides a component of comparatively simple design which is reliably effective in precluding a unin-

tentional detachment of an implement from the coupler as a result of equipment malfunction or operator error.

[0019] From the foregoing detailed description, it will be evident that there are a number of changes, adaptations and modifications of the present invention, which come within the province of those persons having ordinary skill in the art to which the aforementioned invention pertains. However, it is intended that all such variations not departing from the spirit of the invention be considered as within the scope thereof as limited solely by the appended claims.

I claim:

1. A coupler mountable on a dipper stick and tilt assembly of a machine, and detachably connectable to an implement having a pair of spaced, substantially parallel mounting pins, comprising:

a body having means for pivotally connecting said body to said dipper stick, means for pivotally connecting said body to said tilt assembly wherein upon operation of said tilt assembly said body will be caused to pivot about said dipper stick, a fixed jaw portion having an opening for receiving one mounting pin of said implement and a pivotally connected jaw member having an opening for receiving the other of said mounting pins;

a stop latch pivotally connected to said body, having a first arm section biased in a first position obstructing said opening in said fixed jaw;

a latch cam pivotally connected to said body having a first arm section engageable with an arm section of said stop latch for pivoting said stop latch upon pivoting said latch cam;

a fluid actuated cylinder assembly having one of the cylinder and rod members thereof pivotally connected to a second arm section of said latch cam and the other of said cylinder and rod members pivotally connected to said pivotal jaw for pivotal movement of said pivotal jaw upon displacements of said cylinder assembly; and

means cooperable with said cylinder assembly and said latch cam, functional to preclude pivotal movement of said latch cam when said body is disposed in a first orientation, and to permit pivotal movement of said latch cam when said body is disposed in a second orientation.

2. A coupler according to claim 1 wherein said first orientation of said body is upright and said second orientation of said body is inverted.

3. A coupler according to claim 2 wherein said cooperable means is actuated by the force of gravity when said body is in at least one of said positions.

4. A coupler according to claim 1 wherein said cooperable means is pivotally mounted on said one of said cylinder and rod members.

5. A coupler according to claim 4 wherein said first orientation of said body is upright and said second orientation of said body is inverted.

6. A coupler according to claim 5 wherein said cooperable means is pivoted by the force of gravity when said body is in at least one of said positions.

7. A coupler according to claim 1 wherein said cooperable means comprises a lock latch pivotally mounted on said cylinder member.

8. A coupler according to claim 7 wherein said lock latch includes an arm section disposable in obstructing relation to an arm section of said latch cam when said body is disposed in said first orientation and in nonobstructing relation to said last mentioned arm section of said latch cam when said body is disposed in said second orientation.

9. A coupler according to claim 8 wherein said first orientation of said body is upright and said second orientation of said body is inverted.

10. A coupler according to claim 9 wherein said lock latch is pivoted by the force of gravity when said body is pivoted between said first and second positions.

11. A coupler according to claim 10 wherein the pivotal movement of said lock latch is restricted to a selected angle.

12. A coupler according to claim 11 wherein the degree and orientation of said angle relative to a line passing through the pivotal connection of said lock latch to said cylinder member is such that under the force of gravity said lock latch will pivot under the force of gravity out of obstructing relation with said latch cam when said body is moved between said first and second positions and into obstructing relation when said body is moved between said second and first positions.

13. A coupler according to claim 1 wherein said coupler is movable between said first and second positions when connected to said dipper stick and tilt assembly and said tilt assembly is operated to curl and uncurl said coupler.

14. A coupler according to claim 1 wherein said stop latch is provided with an L-shaped configuration.

15. A coupler according to claim 7 wherein said latch cam includes a second arm member pivotally connected to said cylinder member and wherein said lock latch is disposable in a first position when said body is in said first orientation, obstructing the pivotal movement of said latch cam about the pivotal connection thereof with said body, and in a second position when said body is in said second orientation not obstructing the pivotal movement of said latch cam about the pivotal connection thereof with said body.

16. A coupler according to claim 15 wherein said latch cam is pivotally connected to said cylinder member by means of a shaft extending through registered opening therein.

17. A coupler according to claim 16 wherein the last mentioned opening in said latch cam is elongated.

18. A coupler according to claim 17 wherein said elongated opening is open at one end providing said second arm section of said latch cam with a fork-shaped configuration.

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