

Quick Coupler

159159

Field of Invention

G00002

5 This invention pertains generally to a device for connecting a bucket, a breaker, a cutter, a shearer, a compactor or other different kinds of attachments to the free end of a working arm or the like on a piece of work equipment, such as an excavator, backhoe, etc.

Background of the Invention

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The removal and installation of attachments to the free end of a working arm on an excavator has always been a tricky operation. Generally, the attachments are attached using mounting pins, which require all the mounting holes to be perfectly aligned to enable a reasonable slot-through. This has been proven to be a time consuming process due to the weight and
15 bulkiness of the attachments as well as the usually uneven ground conditions.

There is therefore a serious requirement for a coupler that is user friendly and at the same time, allows for the quick and automatic coupling of different attachments to the coupler without anyone having to insert mounting pins through aligned openings. A principal object
20 of the invention is to provide such an improved coupler.

Summary of the Invention

The present invention comprises of a forearm and a rear arm; both pin-jointed together at the
25 top of the arms. Both the arms have a C-shaped hook at the bottom, which will be used to connect to the attachments. The arms are pivotably connected at the top and each arm having mounting holes at the top are placed and align with the corresponding mounting holes of the free end of the working arm, a mounting pin is then inserted respectively, thus link the quick coupler permanently to the free end of the working arm. The C-shaped hook at each arm has
30 a safety catch, which will lock the attachments securely in position. An actuator is placed between the fore and rear arms to control the travel of the arms.

An objective of the invention is to act as a coupling between the free end of a working arm or the like on a piece of work equipment, and various types of attachments, such as a bucket, a breaker, a cutter, a shearer, a compactor or any others.

- 5 Another objective of the invention is to reduce the stresses of the mounting pin of the attachment by not need to carry out destructive modification of the distance of the 2 mounting pin, (usually to make it narrower) to be at same distance as the original bucket's mounting pin, with this new invention, an operator just need to extent or retract the actuator so that both C-shape hooks could hook onto the mounting pin of different kind of attachments
10 having different pin distance (but to be with in the designed range), thus do not disturb the original specifications or safety of the said work attachment.

Another objective of the invention is to ensure that the process of attaching or detaching an attachment is done in a relatively quick fashion.

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Another objective of the invention is to ensure that the attachment will not come loose, released or disattached itself from the C-shaped hooks of the invention with out the positive command of the operator.

20 **Brief Description of the Drawings**

The invention will be fully understood by reference to the following drawings, which are for illustrative purposes only:

- 25 Figure 1 is a perspective view of the complete Quick Coupler.

Figure 2a shows a side view and in general, the method in which the quick coupler before attach to an attachment.

- 30 Figure 2b shows a side view of the quick coupler where the fore C-shaped hook being hooked on to the fore mounting pin of an attachment.

Figure 2c shows a side view of the quick coupler where the rear C-shaped hook being lowered and hook on to the rear mounting pin of the same attachment.

Figure 2d shows side view of the attachment being attached to the quick coupler and ready for its intended use

Figure 3 is a simplified section view, which describes the operation of the actuator.

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Figure 4a is a simplified section view of the quick coupler before the engagement of the safety catches to the mounting pins of the attachment.

Figure 4b is a simplified section view of the quick coupler with the safety catches engaged to the mounting pins of the attachment.

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Detailed Description of the Invention

Referring more specifically to the drawings, for illustrative purposes the present invention is embodied in the apparatus generally shown in Figure 1 through Figure 4. It will be appreciated that the apparatus may vary as to configuration and as to details of the part, and the method may vary as to the specific steps and sequence, without departing from the basic concepts as disclosed herein.

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Figure 1 shows the entire quick coupler (20) and is attached with an attachment (40). Forearm (1) and rear arm (2) of the quick coupler (20) are pivoted together by a pair of pins (3). The forearm (1) is securely and permanently pin jointed to the free end of the working arm (30) by using a fore mounting pin (4), through the aligned mounting holes (17). Similarly, the rear arm (2) is securely and permanently pin jointed to rear link (not shown) of the free end working arm (30) by using a rear mounting pin (5) through the aligned rear link mounting holes (15). This is a permanent fixture.

Actuator (8), which can be manual or mechanical, governs the opening and closing of forearm (1) and rear arm (2) of the quick coupler (20) as shown in figure 3. The actuator (8) is pin jointed to the forearm (1) by using fore actuator pin (22) and rear arm (2) by using rear actuator pin (18). The fore actuator clip (25) and rear actuator clip (19) secure the actuator fore pin (22) and actuator rear pin (18) respectively. The lower end of the forearm (1) having a fore C-shaped hook (9) and the rear arm (2) having a rear C-shaped hook (10) which are opposing to each other. This actuator (8) could retract the arms fully, so that enable the C-

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shape hook to pass through the inner space of the attachment mounting pins (6, 7), and could extend until the C-shaped hooks has positively hooked onto the same fore attachment pin (6) and rear attachment pin (7) of the attachment (40).

- 5 Referring to Figure 2a. When attaching to a attachment, such as a bucket, the actuator (8) is fully retracted so that both arms are closest to each other, thus the opposed C-shaped hook are also at it closest position to enable it to pass through the inner space of the attachment mounting pins (6, 7), the quick coupler (20) is then lowered and move forward until the fore C-shaped hook (9) is hooked onto fore attachment pin (6) of the bucket (40). Operator could
 10 lift up the bucket (40) until it is hung in the air by the fore C-shape hook (9), this will enable the bucket fore pin (6) to automatically sit perfectly into the fore C-shape hook (9) and auto aligned the rear pin (7) to made ready to accept the rear C-shape hook (10).

- The rear C-shape hook (10) is now lower until it is inline with the rear bucket pin (7)
 15 Reference to Figure 2b & 2c, at this time, the actuator (8) is actuated by the operator and extend until the rear C-shape hook (10) has hook onto the rear bucket pin (7), This is illustrated in Figure 2c. Reference will now be made to Figure 4 to detail the operation of the safety catches (11, 12). Referring to Figure 4a, the fore safety catch (11) is securely engaged onto fore attachment pin (6). Referring to Figure 4b, the fore safety pin (13) is inserted to
 20 lock the fore safety catch (11). The fore arm (1) of the quick coupler (20) is now securely attached onto fore attachment pin (6) of the bucket (40).

- Refer to Figure 4 for detail operation of the rear safety catch (12). Referring to Figure 4a, the rear safety catch (12) is securely engaged onto the rear attachment pin (7) of the bucket (40).
 25 Referring to Figure 4b, a rear safety pin (14) is inserted to lock the rear safety catch (12). The rear arm (2) of the quick coupler (20) is now also securely attached onto rear attachment pin (7) of the bucket (40).

- Reference will now be made back to Figure 2. With the quick coupler (20) securely attached
 30 to the bucket (40), the said work equipment is now ready for its intended use as shown in figure 2d.

To detach an attachment (40) from the quick coupler (20), a reverse action must be performed, that is, remove both safety pins (13, 14) first, and secondly, retract the actuator

(8) until both C-shaped hooks are close enough to disconnect from both attachment pins (6, 7).

Referring to Figure 3, the actuator (8) is shown, being pin jointed to forearm (1) at fore
5 actuator pin (22) and rear arm (2) at rear actuator pin (18) respectively. The actuator (8)
governs the opening and closing of forearm (1) and rear arm (2) of the quick coupler (20) in
order for the C-shaped hooks (9, 10) to latch onto the attachment pins (6, 7) of the various
attachments (40). The actuator (8) may be either manually or hydraulically activated. The
actuator, if hydraulically operated, is prevented from self-retraction or other not desired
10 motion by means of a pilot operated check valve in between the actuator ports, or other safety
mechanism. The actuator is designed to have enough extendable length to hook on the
relatively wide attachment pins on the said different kinds of attachments and to retract
enough to hook on the relatively narrow attachment pins on the said different kinds of
attachments.

15 It is to be understood that the present invention may be embodied in other specific forms and
is not limited to the sole embodiment described above. However modification and
equivalents of the disclosed concepts such as those which readily occur to one skilled in the
art are intended to be included within the scope of the claims which are appended thereto.

Claims

1. An apparatus to attach different kinds of attachments to the free end of a working arm, said apparatus comprising:
 - 5 a forearm having a fore C-shaped hook at the lower end of said forearm, which is securely fastened to a fore link of said working arm;
 - a rear arm having a rear C-shape hook at the lower end of said rear arm, which is securely fastened to a rear link of said working arm and is held together with said forearm whereby said fore C-shaped hook and rear C-shaped hook are opposing to each other; and
 - 10 an actuator having both ends mounted to said forearm and rear arm respectively to govern the opening and closing of said arms.
2. The apparatus as claimed in claim 1, wherein said rear arm is pivoted to the said forearm by using a pair of pin that held them together.
- 15 3. The apparatus as claimed in claim 1, wherein said actuator is attached to said forearm by using a fore actuator pin and said rear arm by using a rear actuator pin.
4. The apparatus as claimed in any claims 1 to 3, wherein said forearm is securely fastened by pin jointed to said fore link of said working arm by using a fore mounting pin through aligned fore link mounting hole and said rear arm is securely fastened by pin jointed to said rear link of said working arm by using a rear mounting pin through aligned rear link mounting hole.
- 20 5. The apparatus as claimed in claim 2, wherein said actuator can be operated using manual, hydraulic or other suitable forces.
- 25 6. The apparatus as claimed in claim 5, wherein said actuator governs the opening and closing motions of said forearm and said rear arm about said pair of actuator pins that are holding them together.
- 30 7. The apparatus as claimed in claim 6, wherein said actuator having a pair of actuator clips to secure said actuator pins.

8. The apparatus as claimed in claim 1 or 6, wherein said opening and closing motions are intended to positively hook onto the corresponding pins on the different kinds of attachments.

5 9. The apparatus as claimed in claim 1, wherein said apparatus further comprising a pair of safety catches, each of which is attached adjacent to said fore C-shaped hook of said forearm and adjacent to said rear C-shaped hook of said rear arm.

10. The apparatus as claimed in claim 9, wherein said pair of safety catches, each of which is attached to said forearm and said rear arm using a pair of pins.

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11. The apparatus as claimed in claim 9 and 10, wherein said pair of safety catches act as a safety feature to securely hold said different kinds of attachments.

12. The apparatus as claimed in any claims 1 to 11, wherein said actuator, if hydraulically
15 operated, is prevented from self-retraction or other not desired motion by means of a pilot operated check valve mounted in between said actuator ports or other safety mechanism.

13. The apparatus as claimed in claim 12, wherein said actuator is designed to have enough extendable length to hook on the relatively wide attachment pins on the said different kinds
20 of attachments.

14. The apparatus as claimed in claim 12 and 13, wherein said actuator is also designed to retract enough to hook on the relatively narrow attachment pins on the said different kinds of attachments.