

A bucket assembly

Technical field

This invention relates to a bucket assembly for excavators or loaders, comprising, a bucket portion and a gripping tool arranged to grip, at need, arbitrary objects such as poles, pillars, beams or the like and hold them in relation to the bucket portion.

Background art

A bucket assembly of this type solely intended for loaders is previously known by the British patent specification 1 070 877 which discloses a gripping tool having two claws or claw-like arms which are mounted for pivoting movements towards and away from each other while forming a jaw of variable size for receiving the object. These two claw arms are comparatively long and mounted directly upon the top surface of the bucket portion in such a way that a large portion of each arm always juts out from the upper edge of the bucket portion. In practice this means that the bucket assembly cannot be used for digging purposes since the claw arms forming the gripping tool would on one hand by the existence of the long, jutting arm portions obstruct pivoting of the bucket portion to a normal starting position for digging and on the other hand by the placing of the arms directly on the top surface of the bucket portion preclude a connection of the assembly to the digging arms which are customary for excavators. The arms would also be subjected to considerable wear and strains because they lie quite unprotected on the outside of the bucket portion.

Disclosure of invention

The object of the present invention is to eliminate the above mentioned limitations in the previously known bucket assembly and to provide a more useful assembly with increased working life. In accordance with the characterizing features of the invention this is achieved by the fact that the gripping tool is built into a box-like protective housing into which the tool, through an opening, may be retracted to an inactive, protected position permitting the use of the bucket assembly for digging purposes without hindrance by the gripping tool and out of which the tool may be extended to an active position in which it is capable of gripping said objects. By arranging the gripping tool in this way the bucket assembly may with particularly great advantage first of all be used for digging a pit in the ground and immediately thereafter grip a telephone or cable pole and place the same in the pit.

Further differences between the invention and the prior art

Furthermore, the bucket assembly according to the British patent specification mentioned relies

on the use of two separate piston-cylinder mechanisms for controlling the two claws or arms which jointly form the gripping tool. This construction is unsatisfactory in so far as the claws will move non-uniformly if one of the mechanisms binds or otherwise moves in a manner differing from the manner in which the other mechanism moves; what in turn means that the object which is held by the claws is not centered in relation to the bucket. Rather the contrary the object may on one occasion get to the left and on the other occasion to the right in relation to the center of the bucket; involving working conditions which are difficult to master for the operator who, when it is a question of for instance mounting of telephone poles in ground pits dug by means of the bucket, is dependent on a precise alignment of the pole in the mark pit dug. In order to eliminate this drawback the claws of the bucket assembly of the invention may be connected through suitable connecting means to a control mechanism which is common to both of the claws, said mechanism in operation always transmitting substantially uniform control movements to the two claws while securing an automatic centering of an object being present therebetween.

In the structure according to the British patent specification there is also a risk that the pole, especially if this is of a considerable length, will rotate or pivot relative to the place of grip of the claws around the pole since the two claws are movable towards and away from each other in one and the same plane. This risk is eliminated in the preferred form of the invention by the fact that at least one of the two claws comprises two members or halves which are spaced in the direction parallel to the pivot axis of the claw and between which the other claw may be wholly or partially inserted upon pivoting the claws inwardly towards each other.

Brief description of drawings

With reference to the attached drawings a closer description of an embodiment of the invention put forward as an example will follow hereinafter. In the drawings Figure 1 is a partially simplified perspective view of a bucket assembly according to the invention as viewed obliquely from the front, Fig. 2 a horizontal section through the assembly of Figure 1 the gripping tool in question being shown in its inactive position and Fig. 3 a similar section showing the gripping tool in the active position.

Best mode for carrying out the invention

A bucket for an excavator is generally designated 1 in Fig. 1. In the conventional manner the bucket is designed with a bottom piece 2 extending obliquely upwardly-forwardly, a front piece 3, two side pieces 4 and a top piece 5. Backwardly the bucket has a mouth

designated 6 which is not visible in the drawing. The bucket has an attachment, generally designated 7 which in a suitable manner may be connected to the free end of the arm of the excavator (not shown) in relation to which the bucket is pivotable in the usual manner.

The bucket or bucket portion 1 comprises a gripping tool generally designated 9 which in the example shown consists of two claws 10, 11 which are hingedly mounted relative to the bucket and which are pivotable towards and away from each other while forming a jaw of variable size. More precisely the gripping tool 9 is located in the upper part of the bucket 1 with the gripping claws 10, 11 directed substantially forwardly from the bucket, or in other words directed substantially diametrically opposed to the above-mentioned mouth 6 in the bucket.

According to the invention the gripping tool 9 is built into a protective housing in the form of a box 12 which may be mounted as a unit in or on the bucket. The bucket may either be a bucket which is already manufactured and in use or a newly-produced bucket. In the former case there is given two alternative possibilities of mounting the box 12 to the bucket. Either the box is inserted in the interior of the bucket, a suitable portion of the front piece being cut away in order to permit extension of the claws 10, 11 or the above-mentioned attachment 7 is cut away from the bucket, whereupon the box 12, preferably by welding, is attached to the upper surface of the top piece of the bucket, whereupon the attachment 7 is finally fixed on top of the proper box. In the latter case one achieves the advantage that the box does not encroach on the effective volume of the bucket. As appears may be best from Fig. 2 the box 12 is completely closed except for the opening designated 8 through which the two claws 10, 11 forming the tool 9 are movable between their active and inactive positions respectively.

In Fig. 1 it is shown how the two claws 10, 11 are pivotable each about a vertical hinge or shaft 13 and 14 respectively extending between the top and the bottom of the box 12, said shafts suitably being easy to dismount, e.g. by means of Seeger-rings (not shown). Furthermore it appears how the claw 10 comprises two members or halves 15, 16 which are rather distantly spaced along the shaft 13 and between which the other claw 11 may in its entirety be inserted upon pivoting the claws towards each other. In the embodiment shown also the claw 11 is composed of two interspaced members 17, 18, which gives a good gripping and holding capability in connection with long objects which are located between the claws parallel to the shafts 13, 14.

From Figs. 2 and 3 appears how the claws 10, 11 are hingedly connected to links 19 which in turn are hingedly connected to a yoke 20 being common to both of the claws. This yoke in turn is again hingedly connected to the

free end of the piston rod 21 of a hydraulic piston-cylinder mechanism designated 22 of the double-acting type. At the end remote from the piston rod 21 this piston-cylinder mechanism is hingedly connected to a third fixed hinge shaft 23 which in the example shown is fixed in a special fastener 24 projecting from the box 12. By two hydraulic conduits 25, 26 (of which only the first mentioned one is visible in Fig. 1) the cylinder of the mechanism 22 is connected to the hydraulic system or the power source of the excavator in question. In this way the piston-cylinder mechanism and thereby the gripping tool 9 may be connected from the driving compartment of the excavator.

From Fig. 3 appears how the gripping surfaces 27 of the claws or claw members are of arcuate shape having a gradually increasing radius in the direction of the free ends of the claws. In this way one obtains a favourable grip of objects 28, e.g. poles, having highly varying section sizes.

It should also be pointed out that the piston-cylinder mechanism 22 in the conventional manner advantageously may be equipped with so called hose breakage valves, i.e. safety valves which guarantee that the piston rod 21 remains in a settled position in which the gripping tool maintains its grip of the object in question even in the event of breakage or leakage occurring in anyone of the conduits 25 26.

Function

The bucket described operates in the following way. When the bucket 1 is used for its proper aim, i.e. digging, the claws 10, 11 are kept inserted in the interior of the bucket or the box 12 in the inactive position shown in Fig. 2. In this condition the claws do not form any obstacle whatsoever for the bucket during the digging work thereof. The insertion of the claws is taken care of by the fact that the piston rod 21 is pushed into its innermost position and through the yoke 20 and the links 19 this movement causes the claws to pivot about their respective shafts 13, 14 to the positions shown in Fig. 2. As soon as the need arises to grip an object, e.g. a light pole or a cable pole after finishing the digging of a pit for the pole, the claws 10, 11 may be activated by pushing the piston rod out of its cylinder while extending the claws out of the shell-like exterior of the bucket to the position shown in Fig. 3. After this the object or pole 28 may be gripped between the claws 10, 11 by the piston rod 21 again being pulled into the cylinder which will have the result that the claws are pivoted and caused to contact the pole 28 while fastening the pole in the jaw formed by the claws. As indicated in Fig. 3 the pole 28 will also contact and abut the front portion of the bucket assembly or more precisely about the elements which confine the front opening 8 of the protective box 12. In this condition the pole may easily be raised by pivoting or rotating the entire bucket relative to the

excavator arm in a manner known per se until the pole has assumed a vertical position in which it is retained during the anchoring work.

Possible modifications

Of course the invention is not limited merely to the embodiment described and shown in the drawings. Thus the assembly of the invention is per se useful not only in connection with just excavators but also in connection with for instance loading machines using buckets. Further the invention may be used for gripping other objects than just light poles, e.g. pillars, beams, plates or other things. The gripping tool may also have another design than just the tool shown. Thus it is conceivable to give the claws 10 and 11 such a shape that they will together in their inserted, inactive condition substantially completely fill up the opening 8 in the box while forming an efficient obstacle to the penetration of dirt into the interior of the box during the digging work. In another modification it is possible to direct the piston-cylinder mechanism 22 so as to locate the fixed hinge shaft 23 thereof in the vicinity of the open end of the box 12 while the yoke 20 is located at the closed end of the box, the connection of the gripping claws 10, 11 to the yoke 20 being carried out through links which are considerably longer than the links 19 shown in the drawings and which extend substantially parallel to the cylinder 22.

Claims

1. A bucket assembly for excavators or loaders, comprising bucket portion (1) and gripping tool (9) arranged to grip, at need, arbitrary objects (28), such as poles, pillars, beams or the like and hold them in relation to the bucket portion, characterized in that the gripping tool (9) is built into a box-like protective housing (12) into which the tool, through an opening, may be retracted to an inactive, protected position permitting the use of the bucket assembly for digging purposes without hindrance by the gripping tool and out of which the tool may be extended to an active position in which it is capable of gripping said objects.

2. A bucket assembly according to claim 1, characterized in that the opening of the protective housing (12) and the gripping tool (9) movable in and out therethrough are directed substantially oppositely to the mouth (6) of the bucket portion (1).

3. A bucket assembly according to claim 1 or 2, characterized in that the gripping tool (9) comprises two claws (10, 11) mounted for pivoting movement towards and away from each other, said claws being, through suitable connecting means (19, 20), connected to a control mechanism (22) which is common to both of the claws, said mechanism in operation always transmitting substantially uniform control movements to the two claws while secur-

ing an automatic centering of an object being present therebetween.

4. A bucket assembly according to claim 3, characterized in that the connecting means between the claws (10, 11) and the control mechanism (22) consist of two links (19) which are hingedly connected to the claws at appropriate locations and in turn hingedly connected to a common yoke (20) which is movable forwardly and backwardly by being connected to a piston-cylinder mechanism (22) serving as said control mechanism.

5. A bucket assembly according to claim 3 and 4, characterized in that the capability of the claws (10, 11) to pivot is realized by means of two fixed pivot shafts (13, 14) extending between a top and a bottom of the protective housing (12), the control mechanism (22) being hingedly suspended to a fixed third pivot shaft (23) associated with said housing.

6. A bucket assembly according to anyone of claims 3—5, characterized in that at least one (10) of the two claws comprises two members or halves which are spaced in the direction parallel to the pivot shaft (13) of the claw and between which the other claw (11) may be wholly or partially inserted upon pivoting the claws inwardly towards each other.

7. A bucket assembly according to anyone of claims 3—6, characterized in that the gripping surfaces (27) of the claws or claw members are of arcuate shape having a gradually increasing radius in the direction of the free ends of the claws.

Patentansprüche

1. Schaufeleinheit für Grabmaschinen oder Lader mit einer Schaufelteil (1) sowie einem Greifwerkzeug (9) zum bedarfsweisen Ergreifen von beliebigen Gegenständen (28), wie Naste, Säulen, Balken od.dgl. und Festhalten derselben in bezug auf den Schaufelteil, dadurch gekennzeichnet, daß das Greifwerkzeug (9) in einem kastenartigen Schutzgehäuse (12) eingebaut ist, in welches das Werkzeug durch eine Öffnung hindurch in eine unwirksame, geschützte Stellung zur Anwendung der Schaufeleinheit für Grabzwecke ohne Behinderung durch das Greifwerkzeug einziehbar ist und aus welchem das Werkzeug in eine wirksame Stellung ausfahrbar ist, in der es in der Lage ist, die genannten Gegenstände zu ergreifen.

2. Schaufeleinheit nach Patentanspruch 1, dadurch gekennzeichnet, daß die Öffnung des Schutzgehäuses (12) und das durch diese hinein und heraus bewegbare Greifwerkzeug (9) im wesentlichen entgegengesetzt zur Maulöffnung (6) des Schaufelteiles (1) gerichtet sind.

3. Schaufeleinheit nach Patentanspruch 1 oder 2, dadurch gekennzeichnet, daß das Greifwerkzeug (9) zwei Klauen (10, 11), umfaßt, die gegeneinander und voneinander schwenkbar angeordnet sind und mittels geeigneter Verbindungselemente (19, 20) mit einem für beide

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Klauen gemeinsamen Steuermechanismus (22) verbunden sind, wobei der genannte Mechanismus im Betrieb stets im wesentlichen gleichmäßige Steuerbewegungen auf die beiden Klauen überträgt, und dabei eine automatische Zentrierung eines dazwischen befindlichen Gegenstandes gewährleistet.

4. Schaufeleinheit nach Patentanspruch 3, dadurch gekennzeichnet, daß die Verbindungselemente zwischen den Klauen (10, 11) und dem Steuermechanismus (22) aus zwei Lenkern (19) bestehen, die einerseits an geeigneten Stellen mit den Klauen und andererseits mit einem gemeinsamen Joch (20) schwenkbar verbunden sind, das durch Verbindung mit einem als genannter Steuermechanismus dienenden Kolben-Zylinder-Mechanismus (22) vorwärts und rückwärts bewegbar ist.

5. Schaufeleinheit nach den Patentansprüchen 3 und 4, dadurch gekennzeichnet, daß die Schwenkbarkeit der Klauen (10, 11) durch zwei fixe Schwenkzapfen (13, 14) gegeben ist, die sich zwischen dem oberen und dem unteren Teil des Schutzgehäuses (12) erstrecken, wobei der Steuermechanismus (22) drehbar an einem fixen dritten Schwenkzapfen (23) angelenkt ist, der am genannten Gehäuse befestigt ist.

6. Schaufeleinheit nach einem der Patentansprüche 3 bis 5, dadurch gekennzeichnet, daß wenigstens eine (10) der beiden Klauen zwei Teile oder Hälften umfaßt, die in Richtung parallel zum Schwenkzapfen (13) der Klaue im Abstand angeordnet sind und zwischen welche die andere Klaue (11) beim Schwenken der Klauen einwärts gegeneinander ganz oder teilweise einbringbar ist.

7. Schaufeleinheit nach einem der Patentansprüche 3 bis 6, dadurch gekennzeichnet, daß die Greifflächen (27) der Klauen oder Klauenteile mit in Richtung der freien Enden der Klauen allmählich zunehmendem Radius bogenförmig ausgebildet sind.

Revendications

1. Ensemble de godet pour excavatrices ou chargeuses, comprenant un godet proprement dit (1) et un outil de préhension (9) agencé de façon à saisir, si besoin est, des objets quelconques (28), tels que poteaux, piliers, poutres ou autres similaires, caractérisé en ce que l'outil de préhension (9) est encastré dans un carter de protection (12) en forme de caisson, à l'intérieur duquel il peut, en se rétractant à travers une ouverture, prendre une position de repos, dans laquelle il est protégé et permet, sans le gêner, d'utiliser l'ensemble de godet à des fins de

creusement, et hors duquel il peut, en se déployant, prendre une position de travail, dans laquelle il peut saisir lesdits objets.

2. Ensemble de godet selon la revendication 1, caractérisé en ce que l'ouverture du carter de protection (12) et l'outil de préhension (9) qui entre dans le carter et en sort à travers elle sont tournés sensiblement vers l'opposé de l'entrée (6) du godet proprement dit (1).

3. Ensemble de godet selon la revendication 1 ou la revendication 2, caractérisé en ce que l'outil de préhension (9) comprend deux mâchoires (10, 11) montées de façon à pouvoir se rapprocher et s'écarter l'une de l'autre par pivotement, les dites mâchoires étant, par l'intermédiaire de moyens de transmission appropriés (19, 20) reliées à un mécanisme de commande commun (22), qui, en service, communique des mouvements de commande toujours sensiblement uniformes aux deux mâchoires, tout en assurant un centrage automatique de l'objet placé entre celles-ci.

4. Ensemble de godet selon la revendication 3, caractérisé en ce que les moyens de transmission entre les mâchoires (10, 11) et le mécanisme de commande (22) sont constitués par deux biellettes qui s'articulent, d'une part, sur les mâchoires en des points appropriés et, d'autre part, sur une chape commune (20) qui peut être déplacée vers l'avant et vers l'arrière par un vérin à pression de fluide (22), auquel elle est reliée et qui constitue ledit mécanisme de commande.

5. Ensemble de godet selon les revendications 3 et 4, caractérisé en ce que le montage à pivotement des mâchoires (10, 11) est réalisé au moyen de deux axes fixes (13, 14) qui s'étendent entre une paroi supérieure et une paroi inférieure du carter de protection (12), le mécanisme de commande s'articulant sur un troisième axe fixe (23) associé au carter.

6. Ensemble de godet selon l'une quelconque des revendications 3 à 5, caractérisé en ce qu'au moins une (10) des deux mâchoires comprend deux parties ou moitiés espacées l'une de l'autre dans une direction parallèle à l'axe d'articulation (13) de cette mâchoire et entre lesquelles l'autre mâchoire (11) peut s'engager entièrement ou partiellement lorsque les mâchoires pivotent l'une vers l'autre.

7. Ensemble de godet selon l'une quelconque des revendications 3 à 6, caractérisé en ce que les faces de préhension (27) des mâchoires ou parties de mâchoires ont une forme curviligne avec un rayon de courbure qui va en augmentant en direction des extrémités libres des mâchoires.

