

Description

Technical Field

This invention relates to bucket arrangements and more particularly to an excavator bucket arrangement that is utilized in both ripping and conventional trenching applications.

Background Art

In the operation of an excavator, it is not uncommon for an operator to encounter several different types of soils as well as several different types of excavation. In order to operate with optimum efficiency, different types of buckets are normally utilized to accommodate the specific type of material or operation being performed at a particular location. There are, however, certain areas that are comprised of materials that are extremely difficult to fracture or penetrate with a conventional excavator bucket. As a result, several bucket modifications have been designed specifically for ripping applications in extremely hard types of soils. These types of buckets, however, demonstrate very little versatility when an attempt is made to excavate in a material that requires a function other than ripping.

Also, in some instances where versatility of a bucket design is sought, the aggressive configuration of the cutting edge that is required in ripping applications will hinder its performance in weaker, plastic or sticky materials. Buckets encountering this problem often have a «V» or wedge shaped cutting edge that positions the teeth in the center of the bucket at a lower elevational plane than those positioned closer to the sides of the bucket. The wedge shape created by this design traps looser material between the teeth and induces packing. This occurrence reduces the capacity of the bucket as well as its ability to load or release the material when dumping.

GB-A-1 210 129 relates to excavator bucket side cutters, which are fitted thereto in pairs one at the forward end of each sidewall of the bucket, adjacent the leading edge of the bottom wall of the bucket, each of such cutters consisting of a cutting blade which when the cutter is in fitted position on the bucket projects from the front edge of the associated sidewall of the bucket so as in the use of the bucket to dig into the spoil to be gathered into the bucket, said cutting blade being carried on a fixing flange therefor which when the cutter is in said fitted position abuts the inner or in some cases the outer face of the associated sidewall of the bucket and which is formed with two or more bolt holes for the reception of bolts by which the cutter is detachably fixable to the sidewall. The object of the invention described in GB-A-1 210 129 is to provide a simple modification of excavator bucket side cutters as above identified which will enable the same side cutter to be used with anyone of

two or more different buckets having respectively different dispositions of the centers of a cutter fixing bolt locating holes in the sidewalls of the buckets. This is achieved by suitably contouring the bolt holes in the fixing flange of the side cutter to accommodate said different dispositions.

The present invention is directed to overcoming one or more of the problems as set forth above.

Disclosure of the Invention

In one aspect of the present invention, a bucket arrangement is provided as defined in claim 1. In another aspect of the present invention a bucket arrangement is provided as defined in claim 6. Preferred embodiments of the invention are disclosed in the dependent claims.

A bucket arrangement as set forth above, not only operates extremely well in ripping applications required in very hard materials, but also is extremely efficient when operating in weaker, more plastic materials.

Brief Description of the Drawings

Fig. 1 is a side elevational view of an excavator bucket arrangement that embodies the principles of the present invention.

Fig. 2 is a front elevational view taken along lines II-II of Fig. 1.

Fig. 3 is a partial sectional view taken along lines III-III of Fig. 1.

Fig. 4 is an enlarged fragmentary view of a portion of the bucket arrangement as indicated in Fig. 1.

Fig. 5 is a reduced, diagrammatical side view of the present invention shown rotated to a first operating position.

Fig. 6 is a front view taken along lines IV-IV of Fig. 5.

Fig. 7 is a reduced, diagrammatical side view of the present invention shown rotated to a second operating position.

Fig. 8 is a front view taken along lines VI-VI of Fig. 7.

Best Mode for Carrying Out The Invention

Referring to Fig. 1 of the drawings, a bucket arrangement for a construction vehicle, such as an excavator or backhoe, is shown generally at 10. The bucket is generally defined by a shell configuration having a continuous wrapper plate 12 that forms an upper portion 14, a back portion 16 and a bottom portion 18. A pair of plates 20 are positioned on opposite sides of the wrapper plate 12 to form sidewalls of a material receiving receptacle 22.

The bucket 10 is pivotally mounted at 24 to a stick member 26 that is connected to the vehicle by a boom member (not shown). The bucket is

rotated about its mounting 24 by a bucket control linkage 28 that includes a power link 30, an idler link 32, and a fluid actuated control cylinder 34. The cylinder 34 is positioned between the stick 26 and the bucket control linkage 28 and causes the bucket to rotate in a forward and rearward direction as it is extended and retracted.

The bucket 10 is provided with a cutting edge 36 that is formed or otherwise positioned laterally along a forward portion 38 of the bottom portion 18 of the bucket. A first ground penetrating means 40, in the form of a ground engaging tooth assembly, 41 is formed on the bucket as an integral portion of each sidewall 20. Each tooth assembly 41 is of the type used in digging or ripping applications and includes a shank or adapter 42 that supports a removable tooth member 44. Each tooth assembly 41 extends from the sidewalls 20 at an angle that substantially coincides with that defined by the bottom portion 18 of the wrapper plate 12. Thus each tooth effectively forms an extension of the bottom portion 18 where it joins the sideplates 20. Such extension places the tooth members 44 at a position above the cutting edge 36. A second penetrating means 48 is connected directly to the cutting edge 36 and includes a second pair of ground engaging tooth assemblies 50. The second pair of teeth 50 are positioned along a central portion 52 of the cutting edge 36 and are generally equally spaced therealong with respect to the first pair of tooth assemblies 41 and each other. The construction of the second pair of tooth assemblies 50 are essentially the same as that of the first pair of tooth assemblies 41. Each of the second tooth assemblies 50 have a shank or adapter 54 that extends downwardly from the cutting edge 36 to support a removable tooth member 56. The shank 54 is positioned to extend below the cutting edge 36 at a preselected angle A of approximately 40 degrees with respect to the first pair of tooth assemblies 41. While an angle of 40 degrees is considered optimum, an angle within the range of 25 to 45 degrees is adequate.

When operating the bucket assembly 10 in material that is extremely difficult to penetrate, such a homogeneous limestone or coral, the control cylinder 34 of the bucket control linkage 28 is actuated to position the bucket 10 as shown in Figs. 5 and 6. Through manipulation of the stick 26 and the boom members, in a well known manner, the bucket is moved in a forward direction to begin penetration of the ground and the subsequent removal of the fractured material from a trench 58 that is subsequently formed. With the bucket so positioned, only the first pair of ground engaging tooth assemblies 41 engage a bottom portion 59 of the trench 58 and fracture material that is located along an outer portion 60 thereof that is adjacent the sidewalls 20 of the bucket 10. Upon continuation of movement along the trench, the bucket 10 may be repositioned by the control cylinder 34 to an attitude shown in Figs. 7 and 8. In this position, the second pair of ground engaging tooth assemblies 50 may be

brought into contact the trench 58 at a location behind the first pair of tooth assemblies 41. The second pair of teeth will engage the trench 58 to penetrate and fracture the material along a central portion 62 thereof. Since the material along the outer portion 60 of the trench has previously been fractured and/or removed, the material in the center will be much more easily penetrated and fractured. If desired, the bucket may be rotated to a position wherein only the second pair of tooth assemblies 50 will engage the trench. Finally, the bucket 10 may be positioned with both of the first and second pairs of ground engaging tooth assemblies 41 and 50 simultaneously engaged with the trench 58 and the entire floor portion thereof may be graded to relatively flat contour. The bucket 10 may also be utilized in this position when excavating in weaker materials to take a complete "bite", and fill the bucket receptacle at once. Since the cutting edge 36 has a substantially planar configuration and is part of a rectangular opening formed by the receptacle, the positioning of the first and second tooth assemblies 41 and 50 with respect to the cutting edge 36 will allow the bucket 10 to perform in a fashion similar to that of a general purpose bucket. When operating as such, the material packing that is inherent in many buckets designed primarily for ripping is avoided.

Other aspects, objects and advantages of this invention can be obtained from a study of the drawings, the disclosure, and the appended claims.

Claims

1. A bucket arrangement (10) defining a bottom portion (18) and a pair of sidewalls (20), and being movable in a forward, material receiving direction comprising:

a planar cutting edge (36) defined on the bottom portion (18) of the bucket arrangement and extending between said sidewalls (20);

a first penetrating tooth assembly (41) defined on a lower portion of each of said sidewalls (20) at a location forward of the point at which the cutting edge (36) joins the sidewalls (20) and extending forwardly therefrom to a position that is elevationally above that of the cutting edge (36) and being selectively positionable to be in sole ground engaging contact immediately adjacent the sidewalls (20) of the bucket arrangement; and

a plurality of second penetrating tooth assemblies (50) connected to the cutting edge (36) along a generally straight line with respect to each other and extending downwardly therefrom at a preselected angle with respect to the first penetrating tooth assembly (41) and at a location spaced rearwardly therefrom, and being selectively positionable to be in sole ground engaging contact along an area between said first penetrating tooth assemblies (41).

2. The bucket arrangement as set forth in claim



1, wherein said bucket arrangement is utilized with an excavating vehicle and is adapted for use in digging trenches.

3. The bucket arrangement as set forth in claim 1, wherein the first penetrating tooth assembly (41) is incorporated into the bucket arrangement (10) as an integral portion solely of each of the sidewalls (10).

4. The bucket arrangement as set forth in claim 1, wherein the cutting edge (36) is spaced rearwardly from the first penetrating tooth assembly (41) to selectively permit the simultaneous ground engagement of both the first and second penetrating tooth assemblies (41, 50) to permit the leveling or grading thereof.

5. The bucket arrangement as set forth in claim 1, wherein the preselected angle includes a range of 20 to 45 degrees.

6. A bucket arrangement having opposed sidewalls (20) and a bottom portion defining a planar cutting edge (36) extending therebetween and being adapted for movement in a forward direction for excavation of material, comprising:

a first ground engaging tooth assembly (41) defined by each of the sidewalls of the bucket arrangement at a location forward of the connection between said sidewalls (20) and said cutting edge (36) and extending therefrom to a position above said cutting edge (36); and

a pair of second ground engaging tooth assemblies (50) positioned in a generally straight line along the cutting edge (36) of the bucket arrangement to extend downwardly therefrom at a preselected angle with respect to the first ground engaging tooth assembly (41) and being rearwardly spaced therefrom, said bucket arrangement being selectively operable between a first position wherein only the first ground engaging tooth assembly is engaged with the ground at a location solely subjacent the sidewalls, and a second position wherein only the second ground engaging tooth assemblies are engaged with the ground subjacent the area solely between said sidewalls, and a third position wherein said first and second ground engaging tooth assemblies are in simultaneous engagement with the ground to permit the grading of the ground to a relatively flat profile.

7. The bucket arrangement as set forth in claim 6, wherein the preselected angle falls within a range of 20 to 45 degrees.

8. The bucket arrangement as set forth in claim 6, wherein said bucket arrangement (10) is adapted for use with an excavator having a boom member and a stick member (26), said bucket arrangement (10) being mounted on the stick member (26) for relative rotation therewith between the first, second, and third positions by a bucket control linkage (28).

Patentansprüche

1. Eine Kübelanordnung (10), die ein Bodenteil (18) und ein Paar von Seitenwänden (20) definiert

und in einer vorwärts gerichteten Materialaufnahmerichtung beweglich ist, wobei folgendes vorgesehen ist:

eine ebene Schneidkante (36) definiert am Bodenteil (18) der Kübelanordnung und sich zwischen den Seitenwänden (20) erstreckend;

eine erste Eindring-Zahnanordnung (41) definiert an einem unteren Teil jeder der Seitenwände (20) an einer Stelle nach vorne gegenüber dem Punkt, wo die Schneidkante (36) die Seitenwände (20) schneidet und sich von dort aus nach vorne erstreckend zu einer Position, die höhenmäßig oberhalb der Schneidkante (36) liegt und selektiv positionierbar ist, um unmittelbar benachbart zu den Seitenwänden (20) der Kübelanordnung in einzigem Erdeingriffskontakt zu stehen;

und eine Vielzahl von zweiten eindringenden Zahnanordnungen (50) verbunden mit der Schneidkante (36) längs einer im ganzen geraden Linie bezüglich einander und sich von dort nach unten unter einem vorgewählten Winkel bezüglich der ersten eindringenden Zahnanordnung (41) sich erstreckend, und zwar an einer Stelle mit Abstand nach hinten demgegenüber angeordnet und selektiv positionierbar, um in einzigem Erdeingriffskontakt längs einem Gebiet zwischen den ersten eindringenden Zahnanordnungen (41) zu stehen.

2. Kübelanordnung nach Anspruch 1, wobei die Kübelanordnung mit einem Grabfahrzeug verwendet wird und geeignet ist zum Graben von Gräben.

3. Kübelanordnung nach Anspruch 1, wobei die erste eindringende Zahnanordnung (41) in die Kübelanordnung (10) als ein integraler Teil allein von jeder der Seitenwände (20) eingebaut ist.

4. Kübelanordnung nach Anspruch 1, wobei die Schneidkante (36) nach hinten mit Abstand gegenüber der ersten Eindring-Zahnanordnung (41) angeordnet ist, um selektiv den gleichzeitigen Erdeingriff beider, der ersten und zweiten Eindringzahnanordnungen (41, 50) zu gestatten, um das Nivellieren oder Gradieren zu ermöglichen.

5. Kübelanordnung nach Anspruch 1, wobei der vorgewählte Winkel einen Bereich von 20 bis 45° umfaßt.

6. Kübelanordnung mit entgegengesetzt liegenden Seitenwänden (20) und einem Bodenteil zur Definition einer ebenen Schneidkante (36), die sich dazwischen erstreckt und für eine Bewegung in Vorwärtsrichtung zum Herausheben von Material geeignet ist, wobei folgendes vorgesehen ist:

eine erste Erdeingriffszahnanordnung (41) definiert durch jede der Seitenwände der Kübelanordnung an einer Stelle nach vorne gegenüber der Verbindung zwischen den Seitenwänden (20) und der Schneidkante (36) und sich von dort zu einer Position oberhalb der Schneidkante (36) erstreckend; und

ein Paar von zweiten Erdeingriffszahnanordnungen (50) positioniert in einer im ganzen geraden Linie längs der Schneidkante (36) der Kübelanordnung, um sich von dort unter einem vorgewählten Winkel bezüglich der ersten Erdeingriff-



szahnanordnung (41) nach unten zu erstrecken, und zwar nach hinten mit Abstand demgegenüber angeordnet, wobei die Kübelanordnung selektiv zwischen einer ersten, zweiten und dritten Position betätigbar ist, wobei in der ersten Position nur die erste Erdeingriffszahnanordnung mit der Erde in Eingriff steht an einer Stelle allein benachbart unterhalb der Seitenwände, wobei in der zweiten Position nur die zweiten Erdeingriffszahnanordnungen mit der Erde in Eingriff stehen an einer Stelle allein benachbart unterhalb der Seitenwände, und wobei in der dritten Position die ersten und zweiten Erdeingriffszahnanordnungen gleichzeitig in Eingriff stehen mit der Erde, um das Gradieren der Erde auf ein relativ flaches Profil zu gestatten.

7. Kübelanordnung nach Anspruch 6, wobei der vorgewählte Winkel in einen Bereich von 20 bis 45° fällt.

8. Kübelanordnung nach Anspruch 6, wobei die Kübelanordnung (10) geeignet ist zur Verwendung bei einem Bagger mit einem Auslegerglied und einem Stielglied (26), wobei die Kübelanordnung (10) am Stielglied (26) befestigt ist, und zwar für eine relative Drehung zwischen den ersten, zweiten und dritten Positionen durch ein Kübelsteuergestänge (28).

Revendications

1. Agencement de godet (10) définissant une partie de fond (18) et une paire de parois latérales (20), et étant déplaçable dans une direction de réception de matériaux dirigée vers l'avant, comprenant :

un bord coupant plan (36) défini sur la partie de fond (18) de l'agencement de godet et s'étendant entre lesdites parois latérales (20) ;

un premier ensemble de dents pénétrantes (41) défini sur une partie inférieure de chacune desdites parois latérales (20) en un emplacement à l'avant du point auquel le bord coupant (36) se réunit aux parois latérales (20) et s'étendant vers l'avant depuis celles-ci jusqu'à une position qui est en élévation au-dessus de celle du bord coupant (36) et étant sélectivement positionnable pour se trouver dans un unique contact d'implantation dans le sol immédiatement adjacent aux parois latérales (20) de l'agencement de godet, et

un second ensemble de dents pénétrantes (50) relié au bord coupant (36) le long d'une ligne généralement droite par rapport à l'autre et s'étendant vers le bas depuis le bord coupant suivant un angle présélectionné par rapport au premier ensemble de dents pénétrantes (41) et à un emplacement espacé de celui-ci vers l'arrière, et étant sélectivement positionnable pour être dans un unique contact d'implantation dans le sol le long d'une surface entre ledit premier ensemble de dents pénétrantes (41).

2. Agencement de godet selon la revendication 1, dans lequel ledit agencement de godet est utilisé avec un véhicule d'excavation et est prévu pour servir dans le creusement de tranchées.

3. Agencement de godet selon la revendication 1, dans lequel le premier ensemble de dents pénétrantes (41) est intégré dans l'agencement de godet (10) sous la forme d'une partie solidaire seulement de chacune des parois latérales (20).

4. Agencement de godet selon la revendication 1, dans lequel le bord coupant (36) est séparé vers l'arrière du premier ensemble de dents pénétrantes (41) pour permettre sélectivement l'implantation simultanée dans le sol à la fois des premier et second ensembles de dents pénétrantes (41, 50) afin d'en permettre le nivelage ou aplanissement.

5. Agencement de godet selon la revendication 1, dans lequel l'angle présélectionné comprend une plage de 20 à 45 degrés.

6. Agencement de godet comportant des parois latérales opposées (20) et une partie de fond définissant un bord coupant plan (36) s'étendant entre celles-ci, et étant prévu pour un déplacement dans une direction dirigée vers l'avant pour l'excavation de matériaux, comprenant :

un premier ensemble de dents pour implantation dans le sol (41) défini par chacune des parois latérales de l'agencement de godet en un emplacement à l'avant de la liaison entre lesdites parois latérales (20) et ledit bord coupant (36) et s'étendant depuis celles-ci jusqu'à un emplacement au-dessus dudit bord coupant (36), et

une paire de seconds ensembles de dents pour implantation dans le sol (50) positionnés dans une ligne généralement droite le long du bord coupant (36) de l'agencement de godet pour s'étendre vers le bas depuis celui-ci suivant un angle présélectionné par rapport au premier ensemble de dents pour implantation dans le sol (41) et étant espacés vers l'arrière depuis celui-ci, ledit agencement de godet étant sélectivement exploitable entre une première position dans laquelle seul le premier ensemble de dents pour implantation dans le sol est implanté dans le sol en un emplacement seulement sous-jacent aux parois latérales, et une seconde position dans laquelle seuls les seconds ensembles de dents pour implantation dans le sol sont implantés dans le sol sous-jacent à la surface seulement entre lesdites parois latérales, et une troisième position dans laquelle lesdits premier et second ensembles de dents pour implantation dans le sol sont implantés simultanément dans le sol pour permettre l'aplanissement du sol jusqu'à un profil relativement plat.

7. Agencement de godet selon la revendication 6, dans lequel l'angle présélectionné tombe dans une plage de 20 à 45 degrés.

8. Agencement de godet selon la revendication 6, dans lequel ledit agencement de godet (10) est prévu pour une utilisation avec un excavateur comportant un élément formant poutre et un élément formant bras (26), ledit agencement de godet (10) étant monté sur l'élément formant bras (26) pour une rotation relative avec celui-ci entre les première, seconde et troisième positions à l'aide d'une tringlerie de commande de godet (28).

