

Description

This invention relates generally to a corner tooth for a bucket to protect the bucket sidewall member from excessive wear and to aid bucket penetration of the ground.

The sidewall members of a bucket, especially an excavator bucket, wear excessively due to continuous scrubbing contact with the ground during digging operations. Some use special side cutters connected to the sidewall to help overcome this problem. Even though these special cutters help, they add additional costs in the form of materials and manufacturing operations. Others have used various forms of teeth secured to the front corner of the bucket. Even though these help protect the sidewall and aid in the ability of the bucket to work in hard ground, they also hamper penetration due to their design. One form of these has two ground engaging points that requires moving the tooth from one corner to the other to obtain the best total wear life. This form of tooth requires down time for changing the tooth from one corner to the other and inhibits penetration due to the extra point that has to penetrate the ground. Another form of tooth is made to fit only on one corner of the bucket. Consequently, it is necessary to manufacture and stock two different styles for repair or replacement.

US-A-3959901 discloses generally an earth working tooth which is arranged to be attached to a forwardly projecting adapter at the leading edge of a bucket, the adapter having upper and lower surfaces which converge towards one another in the forward direction and substantially parallel side surfaces; the tooth comprising an attachment portion having a pair of laterally spaced substantially parallel side wall portions and opposed upper and lower mutually converging wall portions all connected by an end portion to define a socket which will, in use, be complementary in shape to, and receive, the bucket adapter to maintain the tooth in a normal working position; a first, vertical plane defined in the tooth by a central longitudinal axis of the socket, when the tooth is in its normal working position; a second plane defined in the tooth by the central axis and perpendicular to the first plane; a ground engaging portion having a single substantially flat member spaced from one of the planes and connected to and extending from one of the wall portions; and a single reinforcement rib extending perpendicularly from the flat member and being connected to both the flat member and the end portion; the reinforcement rib being centrally disposed along the other of the planes and the tooth being symmetrical about the other of the planes. However the particular tooth described is a centre tooth and nothing is taught about the manner in which such a tooth may be adapted for use in a corner tooth. According to the invention an earth working tooth of the kind generally disclosed in US-A-3959901 is characterised in that the ground engaging portion is spaced from

the first, vertical plane and is connected to and extends from one of the side wall portions whereby the tooth may be attached to an adapter at either end of the leading edge of the bucket to protect the adjacent bucket side wall from wear.

In the accompanying drawings:—

Fig. 1 shows a bucket having a tooth illustrating an embodiment of the present invention;

Fig. 2 illustrates a top view of the tooth and its connection to the bucket;

Fig. 3 illustrates a side view of the tooth; and,

Fig. 4 illustrates another embodiment of the tooth.

Referring now to the drawings, and particularly to Fig. 1, an earth working tooth 10 is shown for use on the corner of a bucket 12. Another tooth 10' is shown on the opposite corner. Since both teeth are identical, only one will be described in detail.

The bucket 12 has a body portion 14, first and second sidewall members 16, 18, a leading edge 20 secured to the body portion 14 and to the first and second sidewall members 16, 18. First and second tooth adapters 22, 24 are secured to the leading edge at opposite ends thereof and a plurality of centre teeth adapters 26 are secured to the leading edge 20 spaced between the first and second tooth adapters 22, 24. It is recognized that any number of centre teeth adapters 26 may be used depending on the width of the bucket 12. In use, the plurality of centre teeth adapters would have teeth mounted thereon.

The tooth 10, as more clearly shown in Figs. 2 and 3, includes an attachment portion 30 and a ground engaging portion 34. The attachment portion 30 has a pair of laterally spaced side wall portions 36, and a spaced pair of upper and lower wall portions 28, all connected at one end by an end portion 40. A socket 42 is defined by the wall portions 36, 38 and the end portion 40. The socket 42 is adapted to engage the adapter 22 and maintain the tooth in a normal working position with respect to the ground. A hole 44 is defined in each of the side wall portions 36 and opens into the socket 42.

The laterally spaced side wall portions 36 are generally parallel to each other. Due to casting or forging requirements, a normal draft angle of 3 to 5 degrees on each side is permitted. The pair of spaced wall portions 38 converge inwardly to form an acute angle ranging from approximately 25—35 degrees. Consequently, the width of the side wall portions 36 is narrower at the intersection with the end portion 40.

A central axis 46 is defined in the tooth 10 longitudinally through the centre of the socket 42. A first plane 48 is defined along the central axis 46 and is vertically oriented with respect to the normal working position of the tooth 10. A second plane 50 is defined along the central axis 46 in the tooth 10 and perpendicular to the first plane 48.

The ground engaging portion 34 has a single substantially flat member 52 connected to one of the laterally spaced side wall portions 36 and a single reinforcement rib 54 centrally disposed

along the second plane 50 and connected to both the flat member 52 and the end portion 40. The flat member 52, as clearly shown in Fig. 2, is not parallel to the longitudinal axis 46 but is generally perpendicular to the second plane 50. Furthermore, the flat member 52 is spaced from the first plane 48 and is closest to the first plane 48 at the point of intersection with the one side wall portion 36. The width of the flat member 52 is substantially the same as the width of the one side wall portion at the point of intersection with the one side wall portion and progressively tapers to a narrow width at the other end less than one-third the width of the one side wall portion. Preferably the width at the other end is less than the thickness of the reinforcement rib 54.

The reinforcement rib 54 is generally triangular in shape having the longest side extending from the other side wall portion 36 and ending adjacent the narrow end of the flat member 52.

Fig. 4 illustrates another embodiment of the present invention. The tooth 10' is the same as the aforementioned tooth 10 with the exception that the flat member 52' of tooth 10' is parallel with the first plane 48.

Industrial Applicability

During operation of the bucket 12 with the tooth 10 attached to the first corner tooth adapter 22 and the other tooth 10' attached to the second corner adapter 24, the flat members 52 of the respective teeth 10, 10' penetrate the earth and cut the side wall of the trench thus greatly reducing contact of the first sidewall 16 with the side of the trench. The narrow width of the flat member 52 at the leading end enhances the ability of the tooth 10 to penetrate the earth while the reinforcement rib 54 adds strength to the tooth without adversely affecting its ability to penetrate. It should be recognized that the tooth 10' can be used on the bucket 12 in place of the tooth 10 or 10'.

Since the tooth 10/10' is symmetrical along the second plane 50, the tooth 10/10' can be used on either corner simply by turning it 180° about the central axis 46 and mounting it on the second corner tooth adapter 24.

The earth working tooth 10/10' set forth above provides protection of the side wall member 16/18 and high strength while having good penetration ability as it wears. Due to the symmetry of the tooth, it is used on either corner thus eliminating the need to manufacture and stock more than one part number.

Claims

1. An earth working tooth (10/10') which is arranged to be attached to a forwardly projecting adapter (22, 24) at the leading edge (20) of a bucket (12), the adapter having upper and lower surfaces which converge towards one another in the forward direction and substantially parallel side surfaces; the tooth comprising an attachment portion (30) having a pair of laterally spaced

substantially parallel side wall portions (36) and opposed upper and lower mutually converging wall portions (38) all connected by an end portion (40) to define a socket (42) which will, in use, be complementary in shape to, and receive, the bucket adapter to maintain the tooth (10/10') in a normal working position; a first, vertical plane (48) defined in the tooth (10/10') by a central longitudinal axis (46) of the socket (42), when the tooth is in its normal working position; a second plane (50) defined in the tooth (10/10') by the central axis (46) and perpendicular to the first plane (48); a ground engaging portion (34) having a single substantially flat member (52) spaced from one of the planes and connected to and extending from one of the wall portions; a single reinforcement rib (54) extending perpendicularly from the flat member (52) and being connected to both the flat member (52) and the end portion (40); the reinforcement rib (54) being centrally disposed along the other of the planes and the tooth (10/10') being symmetrical about the other of the planes; characterised in that the ground engaging portion (34) is spaced from the first, vertical plane (48) and is connected to and extends from one of the side wall portions (36) whereby the tooth may be attached to an adapter (24) at either end of the leading edge (20) of the bucket to protect the adjacent bucket side wall (16, 18) from wear.

2. A tooth (10/10') according to claim 1, wherein the reinforcement rib (54) is generally triangular in shape with the longest side extending from the attachment portion (30) adjacent to the other side wall portion (36) to the end of the flat member (52) remote from the attachment portion (30).

3. A tooth (10/10') according to claim 2, wherein the substantially flat member (52) has, at its end adjacent to the attachment portion (30), a width substantially equal to the width of the one side wall portion (36) at their point of intersection, and, at its end remote from the attachment portion, a width less than one-third the width at said point of intersection.

4. A tooth (10/10') according to claim 3, wherein the width of the flat member (52) at its end remote from the attachment portion (30) is no greater than the thickness of the reinforcement rib (54).

5. A tooth (10) according to any one of the preceding claims, wherein the flat member (52) is non-parallel with the first, vertical plane (48) and is closest to the first, vertical plane (48) at its intersection with the attachment portion (30).

6. A tooth (10') according to any one of claims 1 to 4, wherein the substantially flat member (52) is generally parallel with the first, vertical plane (48).

7. A tooth (10/10') according to any one of the preceding claims, including a hole (44) in the side wall portions (36) and opening into the socket (42).

8. An earth working bucket (12) having a leading edge (20) adapted for engagement with the ground, a sidewall member (16, 18) connected to one end of the leading edge (20), and a forwardly projecting first tooth adapter (22/24) secured to

along the second plane 50 and connected to both the flat member 52 and the end portion 40. The flat member 52, as clearly shown in Fig. 2, is not parallel to the longitudinal axis 46 but is generally perpendicular to the second plane 50. Furthermore, the flat member 52 is spaced from the first plane 48 and is closest to the first plane 48 at the point of intersection with the one side wall portion 36. The width of the flat member 52 is substantially the same as the width of the one side wall portion at the point of intersection with the one side wall portion and progressively tapers to a narrow width at the other end less than one-third the width of the one side wall portion. Preferably the width at the other end is less than the thickness of the reinforcement rib 54.

The reinforcement rib 54 is generally triangular in shape having the longest side extending from the other side wall portion 36 and ending adjacent the narrow end of the flat member 52.

Fig. 4 illustrates another embodiment of the present invention. The tooth 10" is the same as the aforementioned tooth 10 with the exception that the flat member 52" of tooth 10" is parallel with the first plane 48.

Industrial Applicability

During operation of the bucket 12 with the tooth 10 attached to the first corner tooth adapter 22 and the other tooth 10' attached to the second corner adapter 24, the flat members 52 of the respective teeth 10, 10' penetrate the earth and cut the side wall of the trench thus greatly reducing contact of the first sidewall 16 with the side of the trench. The narrow width of the flat member 52 at the leading end enhances the ability of the tooth 10 to penetrate the earth while the reinforcement rib 54 adds strength to the tooth without adversely affecting its ability to penetrate. It should be recognized that the tooth 10" can be used on the bucket 12 in place of the tooth 10 or 10'.

Since the tooth 10/10" is symmetrical along the second plane 50, the tooth 10/10" can be used on either corner simply by turning it 180° about the central axis 46 and mounting it on the second corner tooth adapter 24.

The earth working tooth 10/10" set forth above provides protection of the side wall member 16/18 and high strength while having good penetration ability as it wears. Due to the symmetry of the tooth, it is used on either corner thus eliminating the need to manufacture and stock more than one part number.

Claims

1. An earth working tooth (10/10") which is arranged to be attached to a forwardly projecting adapter (22, 24) at the leading edge (20) of a bucket (12), the adapter having upper and lower surfaces which converge towards one another in the forward direction and substantially parallel side surfaces; the tooth comprising an attachment portion (30) having a pair of laterally spaced

substantially parallel side wall portions (36) and opposed upper and lower mutually converging wall portions (38) all connected by an end portion (40) to define a socket (42) which will, in use, be complementary in shape to, and receive, the bucket adapter to maintain the tooth (10/10") in a normal working position; a first, vertical plane (48) defined in the tooth (10/10") by a central longitudinal axis (46) of the socket (42), when the tooth is in its normal working position; a second plane (50) defined in the tooth (10/10") by the central axis (46) and perpendicular to the first plane (48); a ground engaging portion (34) having a single substantially flat member (52) spaced from one of the planes and connected to and extending from one of the wall portions; a single reinforcement rib (54) extending perpendicularly from the flat member (52) and being connected to both the flat member (52) and the end portion (40); the reinforcement rib (54) being centrally disposed along the other of the planes and the tooth (10/10") being symmetrical about the other of the planes; characterised in that the ground engaging portion (34) is spaced from the first, vertical plane (48) and is connected to and extends from one of the side wall portions (36) whereby the tooth may be attached to an adapter (24) at either end of the leading edge (20) of the bucket to protect the adjacent bucket side wall (16, 18) from wear.

2. A tooth (10/10") according to claim 1, wherein the reinforcement rib (54) is generally triangular in shape with the longest side extending from the attachment portion (30) adjacent to the other side wall portion (36) to the end of the flat member (52) remote from the attachment portion (30).

3. A tooth (10/10") according to claim 2, wherein the substantially flat member (52) has, at its end adjacent to the attachment portion (30), a width substantially equal to the width of the one side wall portion (36) at their point of intersection, and, at its end remote from the attachment portion, a width less than one-third the width at said point of intersection.

4. A tooth (10/10") according to claim 3, wherein the width of the flat member (52) at its end remote from the attachment portion (30) is no greater than the thickness of the reinforcement rib (54).

5. A tooth (10) according to any one of the preceding claims, wherein the flat member (52) is non-parallel with the first, vertical plane (48) and is closest to the first, vertical plane (48) at its intersection with the attachment portion (30).

6. A tooth (10") according to any one of claims 1 to 4, wherein the substantially flat member (52) is generally parallel with the first, vertical plane (48).

7. A tooth (10/10") according to any one of the preceding claims, including a hole (44) in the side wall portions (36) and opening into the socket (42).

8. An earth working bucket (12) having a leading edge (20) adapted for engagement with the ground, a sidewall member (16, 18) connected to one end of the leading edge (20), and a forwardly projecting first tooth adapter (22/24) secured to





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the leading edge (20) adjacent to its intersection with the sidewall member (16/18), the adapter having upper and lower surfaces which converge towards one another in the forward direction and substantially parallel side surfaces and being connected with the attachment portion (34) of a first tooth (10/10") according to any one of the preceding claims.

9. A bucket (12) further includes a second sidewall member (16/18) connected to the other end of the leading edge (20), a second tooth adapter (22/24), similar to the first tooth adapter, secured to the other end of the leading edge (20) adjacent to its intersection with the second sidewall member (16/18) and connected to the attachment portion (34) of another tooth (10'), similar to the first tooth.

Patentansprüche

1. Ein Erdbearbeitungszahn (10/10"), der zur Befestigung an einem nach vorne ragenden Adapter (22, 24) an der vorderen Kante (20) eines Kübels (12) geeignet ist, wobei der Adapter obere und untere Oberflächen besitzt, die zueinander hin in Vorwärtsrichtung konvergieren und mit im wesentlichen parallelen Seitenoberflächen; wobei der Zahn einen Befestigungsteil (30) aufweist, mit einem Paar von mit seitlichem Abstand im wesentlichen parallelen Seitenwandteilen (36) und entgegengesetzt liegenden oberen und unteren gegenseitig konvergierenden Wandteilen oberen und unteren gegenseitig konvergierenden Wandteilen (38) sämtlich durch einen Endteil (40) verbunden zur Definition eines Sockels (42), der beim Gebrauch in komplementärer Form ist und zur Aufnahme des Kübeladapters dient, um den Zahn (10/10") in einer normalen Arbeitsposition zu halten; eine erste vertikale Ebene (48) definiert im Zahn (10/10") durch eine Mittellängsachse (46) des Sockels (42), wenn der Zahn sich in seiner normalen Arbeitsposition befindet; eine zweite Ebene (50) definiert im Zahn (10/10") durch die Mittelachse (46) und senkrecht zur ersten Ebene (48); einen Erdeingriffsteil (34) mit einem einzigen im wesentlichen flachen Glied (52) mit Abstand angeordnet gegenüber einer der Ebenen und verbunden mit und sich von einem der Wandteile aus erstreckend; eine einzige Verstärkungsrippe (54), die sich senkrecht von dem flachen Glied (52) aus erstreckt und verbunden ist mit sowohl dem flachen Glied (52) als auch dem Endteil (40); wobei die Verstärkungsrippe (54) mittig angeordnet ist, längs der anderen der Ebenen und der Zahn (10/10") symmetrisch um die anderen der Ebenen ausgebildet ist; dadurch gekennzeichnet, daß der Erdeingriffsteil (34) mit Abstand gegenüber der ersten vertikalen Ebene (48) mit Abstand angeordnet ist und mit den Seitenwandteilen (36) verbunden ist und sich von diesen aus erstreckt, wodurch der Zahn an einem Adapter (24) befestigt werden kann, und zwar an jedem Ende der vorderen Kante (20) des Kübels, um die benachbarte Kübelseitenwand (16, 18) gegenüber Abrieb zu schützen.

2. Zahn (10/10") nach Anspruch 1, wobei die Verstärkungsrippe (54) im ganzen von dreieckförmiger Gestalt ist, wobei sich die längste Seite von dem Befestigungsteil (30) benachbart zu dem anderen Seitenwandteil (36) erstreckt, und zwar zu dem Ende des flachen Glieds (52) entfernt gegenüber dem Befestigungsteil (30).

3. Zahn (10/10") nach Anspruch 2, wobei das im wesentlichen flache Glied (52) an seinem Ende benachbart zum Befestigungsteil (30) eine Breite im wesentlichen gleich der Breite des einen Seitenwandteils (36) an ihrem Schnittpunkt besitzt, und wobei das flache Glied (52) an seinem gegenüber dem Befestigungsteil entfernt gelegenen Ende eine Breite aufweist, die kleiner ist als ein Drittel der Breite an diesem Schnittpunkt.

4. Zahn (10/10") nach Anspruch 3, wobei die Breite des flachen Glieds (52) an seinem gegenüber dem Befestigungsteil (30) entfernt liegenden Ende nicht größer ist als die Dicke der Verstärkungsrippe (54).

5. Zahn (10) nach einem der vorhergehenden Ansprüche, wobei das flache Glied (52) nicht parallel zu der ersten vertikalen Ebene (48) ist und am dichtesten liegt zu der ersten vertikalen Ebene (48) an ihrem Schnittpunkt mit dem Befestigungsteil (30).

6. Zahn (10") nach einem der Ansprüche 1 bis 4, wobei das im wesentlichen flache Glied (52) im ganzen parallel mit der ersten vertikalen Ebene (48) ist.

7. Zahn (10/10") nach einem der vorhergehenden Ansprüche mit einem Loch (44) in den Seitenwandteilen (36) und zwar sich in den Sockel (42) öffnend.

8. Erdbearbeitungskübel (12) mit einer vorderen Kante (20) geeignet für den Eingriff mit der Erde, einem Seitenwandglied (16, 18) verbunden mit einem Ende der vorderen Kante (20) und ein nach vorne ragender erster Zahnadapter (22/24) befestigt an der vorderen Kante (20) benachbart zu deren Schnitt mit dem Seitenwandglied (16/18), wobei der Adapter obere und untere Oberflächen besitzt, die zueinander hin in Vorwärtsrichtung konvergieren und im wesentlichen parallele Seitenoberflächen, wobei der Adapter ferner mit dem Befestigungsteil (34) eines ersten Zahns (10/10") nach einem der vorhergehenden Ansprüche verbunden ist.

9. Kübel nach Anspruch 8, wobei der Kübel (12) ferner ein zweites Seitenwandglied (16/18) aufweist, und zwar verbunden mit dem anderen Ende der vorderen Kante (20), und ferner mit einem zweiten Zahnadapter (22/24) ähnlich dem ersten Zahnadapter und zwar befestigt am anderen Ende der vorderen Kante (20) benachbart zu deren Schnitt mit dem zweiten Seitenwandglied (16/18) und verbunden mit dem Befestigungsteil (34) des anderen Zahns (10') ähnlich dem ersten Zahn.

Revendications

1. Dent de travail de la terre (10/10") conçue pour être fixée sur un adaptateur faisant saillie vers l'avant (22, 24) au niveau du bord d'attaque (20)

13

d'un godet (12), l'adaptateur comprenant des surfaces supérieure et inférieure qui convergent vers l'avant l'une vers l'autre et des surfaces latérales sensiblement parallèles; la dent comprenant une partie de fixation (30) comportant une paire de portions de parois latérales sensiblement parallèles espacées latéralement (36) et des portions de parois supérieure et inférieure convergeant mutuellement (38), toutes reliées par une portion d'extrémité (40) pour délimiter une cavité (42) qui, en fonctionnement, aura une forme complémentaire de celle de l'adaptateur du godet pour le recevoir et maintenir la dent (10/10") en position de travail normale; un premier plan vertical (48) défini dans la dent (10/10") par un axe longitudinal central (46) de la cavité (42), lorsque la dent est en position de travail normale; un second plan (50) défini dans la dent (10/10") par l'axe central (46) et perpendiculaire au premier plan (48); une portion d'attaque du sol (34) comprenant un seul élément sensiblement plat (52) espacé par rapport à l'un des plans et relié à l'une des portions de paroi de laquelle elle s'étend; une seule nervure de renforcement (54) s'étendant à angle droit sur l'élément plat (52) et reliée, d'une part, à l'élément plat (52) et, d'autre part, à la portion d'extrémité (40); la nervure de renforcement (54) étant disposée centralement le long du second plan et la dent (10/10") étant symétrique par rapport au second plan; caractérisée en ce que la portion d'attaque du sol (34) est espacée par rapport au premier plan vertical (48) et est reliée à l'une des portions de paroi latérale (36) de laquelle elle s'étend, permettant ainsi de fixer la dent sur un adaptateur (24) à une extrémité ou à l'autre du bord d'attaque (20) du godet afin de protéger la paroi latérale adjacente (16, 18) du godet contre l'usure.

2. Dent (10/10") selon la revendication 1, dans laquelle la nervure de renforcement (54) est de forme sensiblement triangulaire, le grand côté s'étendant depuis la partie de fixation (30) adjacente à la seconde portion de paroi latérale (36) jusqu'à l'extrémité de l'élément plat (52) éloignée de la partie de fixation (30).

3. Dent (10/10"), selon la revendication 2, dans laquelle l'élément sensiblement plat (52) présente, à son extrémité adjacente à la partie de fixation (30), une largeur sensiblement égale à la

largeur de la portion de paroi latérale (36) au niveau de leur point d'intersection, et, à son extrémité éloignée de la partie de fixation, une largeur inférieure au tiers de la largeur au niveau dudit point d'intersection.

4. Dent (10/10") selon la revendication 3, dans laquelle la largeur de l'élément plat (52) au niveau de son extrémité éloignée de la partie de fixation (30), n'est pas supérieure à l'épaisseur de la nervure de renforcement (54).

5. Dent (10) selon l'une quelconque des revendications précédentes, dans laquelle l'élément plat (52) n'est pas parallèle au premier plan vertical (48) et se trouve au plus près du premier plan vertical (48) au niveau de son intersection avec la partie de fixation (30).

6. Dent (10") selon l'une quelconque des revendications 1 à 4, dans laquelle l'élément sensiblement plat (52) est sensiblement parallèle au premier plan vertical (48).

7. Dent (10/10") selon l'une quelconque des revendications précédentes, comprenant un trou (44) percé dans les portions de parois latérales (36) et débouchant dans la cavité (42).

8. Godet (12) pour travaux de terrassement comprenant un bord d'attaque (20) adapté pour entrer en contact avec le sol, un élément de paroi latérale (16, 18) relié à une extrémité du bord d'attaque (20), et un premier adaptateur de dent (22/24) faisant saillie vers l'avant et solidaire du bord d'attaque (20) à proximité de son intersection avec l'élément de paroi latérale (16/18), l'adaptateur comprenant des surfaces supérieure et inférieure qui convergent l'une vers l'autre vers l'avant et des surfaces latérales sensiblement parallèles et étant relié avec la partie de fixation (34) d'une première dent (10/10") telle que définie dans l'une quelconque des revendications précédentes.

9. Godet selon la revendication 8, dans lequel le godet (12) comprend en outre un second élément de paroi latérale (16/18) relié à la seconde extrémité du bord d'attaque (20), un second adaptateur de dent (22/24), analogue au premier adaptateur de dent, solidaire de la seconde extrémité du bord d'attaque (20) à proximité de son intersection avec le second élément de paroi latérale (16/18) et relié à la partie de fixation (34) d'une autre dent (10'), analogue à la première dent.

