

ADAPTER STABILIZATION STRUCTURE FOR BUCKET LIP

BACKGROUND OF THE INVENTION

The present invention relates generally to ground engaging apparatus and, in a representative embodiment thereof, more particularly provides specially designed apparatus for (1) inhibiting undesirable side-to-side movement of a wear member support structure, such as an adapter, relative to a front bucket lip edge on which the adapter is mounted, and (2) shielding the bucket lip edge from operational wear at the wear member mounting location thereon.

In ground engaging arts such as excavation and mining it is common practice to secure a support structure, such as an adapter to which a wear member (such as a replaceable tooth point) may in turn be mounted, to a front edge portion of an excavating bucket lip. Typically, the adapter has rear top and bottom leg portions which straddle the front bucket lip edge and are secured to the bucket lip rearwardly of its front edge to hold the installed adapter in place on the bucket lip. It is considered desirable to inhibit side-to-side movement of the installed adapter relative to the bucket lip, and to additionally shield the front bucket lip edge from operational wear at the adapter installation location thereon.

Previous attempts to meet these two design criteria have often proven to be less than entirely satisfactory due to undesirably high expense and/or complexity. It would accordingly be desirable to provide improved apparatus for stabilizing a lip-mounted ground engaging support structure that was substantially less costly and complex. It is to this goal that the present invention is primarily directed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a downwardly directed partial cross-sectional view through a front edge portion of an excavating bucket lip to which an adapter is removably attached, with the attached adapter being restrained against undesirable side-to-side movement by a specially designed adapter stabilization system embodying principles of the present invention;

FIG. 2 is a schematic exploded partial cross-sectional view of the FIG. 1 structure taken generally along line 2-2; and

FIG. 3 is a perspective view of a front edge portion of the bucket lip with the adapter removed to reveal front stabilizing blocks removably secured to the bucket lip.

DETAILED DESCRIPTION

Turning now to the drawings, a bottom metal excavating bucket lip 10 has top and bottom sides 12 and 14, a front edge 16, and a series of forwardly extending stabilizing projections 18 (only one of which is visible) spaced apart along the length of the front lip edge 16. Spaced rearwardly apart from the front lip edge 16 are a series of connector openings 20 (only one of which is visible) extending downwardly through the lip 10 and aligned with its stabilizing projections 18.

A wear member, representatively in the form of an adapter 22, is removably securable to the front lip edge 16 to form therewith an earth engaging assembly as shown in FIG. 1. Adapter 22 has a pair of rearwardly projecting vertically spaced apart top and bottom legs 24,26 having aligned connector openings 28,30 (see FIG. 2) vertically extending therethrough. Another connector opening 32 (see FIG. 1) horizontally extends through a front or nose portion of the adapter 22 for use in removably connecting another wear member, such as a replaceable tooth point (not shown), to the adapter 22. The adapter 22 is installed on the lip 10 by moving the adapter 22 rearwardly onto the lip 10, as indicated by the arrow 34 in FIG. 2, until a front edge portion of the lip 10 is straddled by the legs 24,26 and the leg openings 28,30 are aligned with the lip opening 20. A suitable connector structure (not shown) is then installed in the aligned openings 28,20,30 to removably retain the adapter 22 on the lip 10 as cross-sectionally illustrated in FIG. 1.

To inhibit undesirable side-to-side movement of the installed adapter 22 (i.e., parallel to the front lip edge 16) relative to lip 10, the present invention provides a specially designed stabilization structure 36 that includes two movable stabilizing block members 38 which are secured to the front lip edge 16 prior to the installation of the adapter 22 on the lip 10. Representatively, the blocks 38 are magnetically secured to the metal lip 10 (for example, by using suitable schematically depicted magnet structures 39) prior to the installation of the adapter 22 on the lip 10 in a manner permitting the blocks 38 to be slidably moved relative to the front lip edge 16 along the length thereof. Other suitable structures and techniques may be alternatively utilized to movably support the stabilizing blocks 38 on the front lip edge 16 prior to installation of the adapter 22 thereon.

The installed stabilizing blocks 38 have (1) sloping front surfaces 40 which are slidably engageable by complementarily sloped interior surfaces 42 positioned within the adapter 22 adjacent the juncture of the adapter legs 24 and 26, (2) curved rear side surfaces 43, (3) relatively narrow outer ends 45 and wider inner ends 47, and (4) facing pocket areas

44 disposed at the junctions of the ends 45,47 and configured to permit entry into the pocket areas 44 of the illustrated lip stabilizing projection 18.

As the adapter 22 is rearwardly moved onto the lip 22, sliding engagement between the sloped adapter surfaces 42 with the complementarily sloped block surfaces 40 causes the blocks 38 to move toward one another along the front lip edge, as indicated by the arrows 46 in FIG. 1, to cause the front lip projection 18 to be received in the facing block pockets 44. The previously mentioned connector structure (not shown) is then operatively placed in the aligned adapter and lip openings 28,20,30. The sloping configurations of the engaged adapter and block surfaces 42,40 substantially inhibits side-to-side horizontal movement of the installed adapter 22 relative to the front lip edge 16, and the installed block members 38 further shield the lip projection 18 from operational wear.

As can be seen, the use of the stabilizing blocks 38 provides a simple, effective and inexpensive technique for achieving the dual functions of shielding the front lip projection 18 from operational abrasion wear and inhibiting undesirable side to side movement of the installed adapter 22 relative to the bucket lip 10. Additionally, these desirable results are achieved without the use of separate fasteners to mount the stabilizing blocks 38 in place. Further, the installed stabilizing blocks 38 automatically shift toward one another along the length of the front bucket lip edge 16 in response to rearward movement of the adapter 22 relative to the lip 10, either during initial installation of the adapter 22 or during subsequent rearward tightening of the adapter 22 on the lip to adjust for operational wear.

The foregoing detailed description is to be clearly understood as being given by way of illustration and example only, the spirit and scope of the present invention being limited solely by the appended claims.

WHAT IS CLAIMED IS:

1. Earth engaging apparatus comprising:
an elongated bucket lip having a front edge portion with a forwardly extending
5 projection thereon;
a wear member operatively disposable on said lip by rearwardly moving said wear
member onto said lip in a manner positioning a front portion of said wear member in a
forwardly overlying relationship with said projection; and
a stabilizing structure mountable on said front edge portion of said lip for
10 movement along the length of said front edge portion toward said projection,
said front portion of said wear member and said stabilizing structure being
relatively configured in a manner such that during rearward positioning of said wear
member on said lip said front portion of said wear member engages said stabilizing
structure and moves it toward said projection.
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2. The earth engaging apparatus of Claim 1 wherein:
said wear member is an adapter.
3. The earth engaging apparatus of claim 2 wherein:
20 said adapter has a rear portion including upper and lower legs configured to
straddle said lip when said adapter is operatively installed thereon.
4. The earth engaging apparatus of Claim 1 wherein:
said stabilizing structure comprises first and second stabilizing block members
25 slidably mountable on said front edge portion of said lip on opposite sides of said
projection.
5. The earth engaging apparatus of Claim 4 wherein:
said front portion of said wear member is configured to engage said first and
30 second stabilizing block members and slide each of them toward said projection in
response to operative rearward positioning of said wear member on said lip.

6. The earth engaging apparatus of Claim 5 wherein:

said first and second stabilizing block members have pocket areas therein which are configured to shieldingly receive portions of said projection in response to movement of said first and second stabilizing block members toward said projection by said wear member.

7. The earth engaging apparatus of Claim 5 wherein:

said first and second stabilizing block members are configured to inhibit undesirable side-to-side movement of said wear member when said wear member is operatively mounted on said lip.

8. The earth engaging apparatus of Claim 4 wherein:

each of said first and second stabilizing block members has a relatively narrow inner end, a relatively wide outer end, a rear side extending between said inner and outer ends, a front side extending between said inner and outer ends and being sloped relative to said rear side, and a pocket area positioned at the juncture of said rear side and said inner end and being configured to receive a portion of said projection in response to movement of the block member along said front edge of said lip toward said projection.

9. The earth engaging apparatus of Claim 1 wherein:

said stabilizing structure includes a stabilizing member and a magnetic structure for slidably attaching said stabilizing member to said front edge portion of said lip for movement along its length toward and away from said projection.

10. The earth engaging apparatus of Claim 1 wherein:

said stabilizing structure includes first and second stabilizing members positionable on said front edge portion of said lip on opposite sides of said projection, and magnetic structures for slidably holding said first and second stabilizing members on said front edge portion of said lip for movement toward and away from said projection.

11. Earth engaging apparatus comprising:

an elongated bucket lip having a front edge portion with a forwardly extending projection thereon; and

first and second stabilizing members mounted on said front edge portion of said lip for slidable movement along its length toward and away from said projection, said first and stabilizing members having pocket portions and being in an operative position on said lip in which opposite side portions of said projection are received in said pocket portions; and

5 a wear member removably mounted on said lip with a front portion of said wear member overlying said first and second stabilizing members and holding them in said operative position in which said stabilizing members shield said projection from operational wear and inhibit undesirable side-to-side motion of said wear member with respect to said lip.

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12. The earth engaging apparatus of Claim 11 wherein:
said wear member is an adapter.

13. The earth engaging apparatus of Claim 11 wherein:
15 said first and second stabilizing members are magnetically held on said front edge portion of said lip.

14. Earth engaging apparatus comprising:
an elongated bucket lip having a front edge portion with a forwardly extending
20 projection thereon; and
first and second stabilizing members mounted on said front edge portion of said lip on opposite sides of said front edge portion of said lip and having pocket portions formed therein, said first and second stabilizing members being slidable along said front edge portion of said lip toward said projection in a manner causing opposite side edge portions
25 of said projection to enter said pocket portions and thus be shielded by said first and second stabilizing members.

15. The earth engaging apparatus of Claim 14 wherein:
said first and second stabilizing members are magnetically mounted on said front
30 edge portion of said lip.

16. A method of attaching a wear member to a bucket lip having a front edge portion with a forwardly extending projection thereon, said method comprising the steps of:

5 slidably mounting first and second stabilizing members on said front edge portion of said lip on opposite sides of said projection for movement along the length of said lip toward and away from said projection; and

rearwardly moving said wear member onto said lip, in an overlying relationship with said projection and said first and second stabilizing members, in a manner causing said wear member to forcibly move said first and second stabilizing members toward said
10 projection.

17. The method of Claim 16 wherein:

each of said first and second stabilizing members has an end with a pocket area formed therein,

15 said slidably mounting step is performed in a manner such that said pocket areas face said projection, and

said rearwardly moving step is performed in a manner causing said portions of said projection to enter said pocket areas.

20 18. The method of Claim 16 wherein:

said slidably mounting step is performed by magnetically attaching said first and second stabilizing members to said front edge portion of said lip.

19. The method of Claim 16 wherein:

25 the first and second stabilizing members, when moved toward said projection by said wear member, function to shield said projection from operational wear and inhibit undesirable side-to-side movement of said wear member relative to said lip.

20. The method of Claim 16 wherein:

30 said method is performed using an adapter as said wear member.