A rolling basket assembly for an agricultural tillage implement. The rolling basket assembly includes a bracket, a first disk and a second disk rotatably connected to the bracket, a plurality of chain assemblies. Each chain assembly includes a first end connected to the first disk and a second end connected to the second disk and a plurality of links looped around one another and collectively forming each chain assembly. Each link includes a first loop, a second loop that is looped around the first loop, and at least one projection extending outwardly from one of the first loop and the second loop.
ROTARY GROUND ENGAGING TOOL WITH DOUBLE LOOP BARBED LINKS

BACKGROUND OF THE INVENTION

[0001] The present invention pertains to agricultural tillage implements and, more specifically, to an auxiliary rotary tool for an agricultural tillage implement.

[0002] Farmers utilize a wide variety of tillage implements to prepare soil for planting. Tillage implements prepare the soil by way of mechanical agitation of numerous types, such as digging, stirring, and overturning. Examples of tillage include plowing (overturning with moldboards or chiseling with chisel shanks), disking, harrowing, sweeping, and cultivating with cultivator shanks. Tillage implements are often classified into two types: vertical or horizontal tillage. Generally, vertical tillage is performed with implements such as coulters or spider wheels. Horizontal tillage, on the other hand, is performed with implements such as sweeps. The employment of vertical and/or horizontal tillage depends upon various aspects of a given situation including soil conditions, equipment, crops to be planted, etc.

[0003] Some tillage implements may include two or more sections coupled together to perform multiple functions as they are pulled through fields by an agricultural vehicle. For example, a field cultivator is capable of simultaneously tilling soil and leveling the tilled soil in preparation for planting. Field cultivators convert compacted soil into a level seedbed with a consistent depth for providing optimal conditions for planting of a crop. Residual crop material, weeds, or other undesired plants disposed on top of the soil are destroyed and worked into the soil.

[0004] A typical field cultivator generally includes a frame that carries a number of ground-engaging tools for working the soil. The tools may include shovels, knives, points, sweeps, coulters, spikes, or plows. For example, a field cultivator may include shank assemblies for creating a level seedbed to facilitate optimal seed growth. Some field cultivators may also include rear auxiliary tools to perform various secondary tasks for finishing the soil. For example, a field cultivator may also include a spike tooth harrow, spring tooth harrow, rolling (aka. crumbler) basket, etc., or any combination thereof for finishing the soil.

[0005] A typical rolling basket includes a reel with numerous horizontally disposed blades. As the rolling basket contacts the ground, it rotates and the blades accordingly break up dirt and sod clods into smaller sizes. The blades may also chop the remaining debris on the top of the soil, smooth out ridges, and slightly pack the field. However, due to the limited cutting depth of the blades and/or the wear on the blades, the rolling basket may undesirably finish the soil. For example, the blades may undesirably leave coarse objects, such as soil clods or other debris, on the surface of the field.

[0006] What is needed in the art is a cost-effective auxiliary rotary tool for creating a smoother and finer strip of soil.

SUMMARY OF THE INVENTION

[0007] In one exemplary embodiment formed in accordance with the present invention, there is provided a rolling basket assembly that generally includes a bracket, an axle, a pair of disks mounted to the bracket, and multiple chain assemblies interconnected between the disks. Each chain assembly includes multiple links which together form the chain assembly. The links are double loop, barbed links that each include two loops and two projections extending from the loops. The links are configured for engaging the soil and creating a fine, loosened, and smooth strip of soil.

[0008] In another exemplary embodiment formed in accordance with the present invention, there is provided a rolling basket assembly for an agricultural tillage implement. The rolling basket assembly includes a bracket configured for connecting to the agricultural tillage implement, a first disk and a second disk configured for being rotatably connected to the bracket and spaced apart from one another by a distance, and a plurality of chain assemblies. Each chain assembly includes a first end connected to the first disk and a second end connected to the second disk such that each chain assembly spans the distance between the first disk and the second disk. Each chain assembly also includes a plurality of links looped around one another and collectively forming each chain assembly. Each link includes a first loop, a second loop that is looped around the first loop, and at least one projection extending outwardly from one of the first loop and the second loop.

[0009] In yet another exemplary embodiment formed in accordance with the present invention, there is provided an agricultural tillage implement for an agricultural vehicle including a frame and at least one rolling basket assembly. Each rolling basket assembly includes a bracket connected to the frame, a first disk and a second disk configured for being rotatably connected to the bracket and spaced apart from one another by a distance and a plurality of chain assemblies. Each chain assembly includes a first end connected to the first disk and a second end connected to the second disk such that each chain assembly spans the distance between the first disk and the second disk. Each chain assembly also includes a plurality of links looped around one another and collectively forming each chain assembly. Each link includes a first loop, a second loop that is looped around the first loop, and at least one projection extending outwardly from one of the first loop and the second loop.

[0010] One possible advantage of the exemplary embodiment of the rolling basket assembly is that each chain assembly has interlocking double loop barbed links, and each link is integrally formed which reduces manufacturing cost and decreases the time required for assembly.

[0011] Another possible advantage of the exemplary embodiment of the rolling basket assembly is that the chain assemblies efficiently break up clods of soil and other debris to desirably finish the soil.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For the purpose of illustration, there are shown in the drawings certain embodiments of the present invention. It should be understood, however, that the invention is not limited to the precise arrangements, dimensions, and instruments shown. Likewise numerals indicate like elements throughout the drawings. In the drawings:

[0013] FIG. 1 illustrates a perspective view of an exemplary embodiment of a rolling basket assembly, which includes a basket formed by end plates and chain assemblies, in accordance with an exemplary embodiment of the present invention;

[0014] FIG. 2 illustrates a perspective view of the basket of the rolling basket assembly of FIG. 1;

[0015] FIG. 3 illustrates a perspective view of a chain assembly for the basket of the rolling basket assembly; and
FIG. 4 illustrates a single link of the chain assembly for the basket of the rolling basket assembly.

**DETAILED DESCRIPTION OF THE INVENTION**

[0017] The terms “forward”, “rearward”, “left” and “right”, when used in connection with the agricultural tillage implement and/or components thereof are usually determined with reference to the direction of forward operative travel of the agricultural vehicle, but they should not be construed as limiting. The terms “longitudinal” and “transverse” are determined with reference to the fore-and-aft direction of the agricultural tillage implement and are equally not to be construed as limiting.

[0018] Referring now to the drawings, and more particularly to FIGS. 1-2, there is shown a rolling basket assembly which is connected to the main frame of an agricultural tillage implement. The rolling basket assembly can be a separate unit attached to the main frame or may be incorporated as part of a primary or secondary ground-engaging tool assembly. For example, the rolling basket assembly can be incorporated as part of a ground-engaging tool assembly which has its own subframe, which in turn connects the rolling basket assembly to the main frame. The ground-engaging tool assembly which incorporates the rolling basket assembly may also include various other tools, such as cutters, disks, etc.

[0019] The agricultural tillage implement may be towed behind an agricultural vehicle, such as a tractor. The agricultural tillage implement may be in the form of any desired implement, such as strip-tilt implement, a disk ripper, or a field cultivator. As can be appreciated, the agricultural tillage implement can include only one or multiple rolling basket assemblies.

[0020] The rolling basket assembly generally includes a bracket which is connected to the subframe, a support rod or axle which is rotatably connected to the bracket, a pair of disks mounted on the axle, and multiple chain assemblies which are interconnected and spanning the distance between the disks. It should be appreciated that the axle, disks, and chain assemblies may together define the basket portion of the rolling basket assembly. In operation, as the disks rotate, the chain assemblies engage the soil and create a fine, loosened, and smooth strip of soil or berm.

[0021] The bracket can be in the form of a “U”-shaped bracket with a pair of receiving holes for mounting the axle, and the bracket can comprise any desired material, such as metal. The axle may further include multiple bearings for rotatably mounting the body of the axle to the bracket. The axle defines a horizontal axis of rotation about which the disks and chains rotate. The axle may comprise any desired material, such as metal. The disks can be fixed to the axle and may also be configured for engaging and breaking up the soil. Each disk may include mounting members, e.g., mounting tabs or plates, for mounting the chain assemblies circumferentially around the outer perimeter of each respective disk (FIG. 2). The mounting members can be integrally formed with the main body of the disks and/or separate elements which are affixed to the main body of the disks. For instance, the mounting members can be in the form of separate plates. Each plate can have a first end fixedly attached, e.g., welded, to a respective disk and a second end connected to a respective chain assembly. The disks can be in the form of any desired annular plates and may comprise any desired shape and material.

[0022] Each chain assembly can be removably attached to the disks. For example, a respective end of the chain assembly can be fastened to a respective mounting member by a fastener disposed within a corresponding receiving hole of the respective mounting member (unnumbered). Furthermore, it should be appreciated that a respective mounting member can have two receiving holes for adjustably mounting the chain assembly such that the chain assembly can either be mounted to a nearer receiving hole which allows the chain assembly to be flexible or a further-away receiving hole which keeps the chain assembly taut. However, each chain assembly can be connected to the disks by being fastened directly to the main body of the disks, welded to the disks, and/or looped through a respective receiving hole in the disks. The chain assemblies are shown to span the distance between the disks. In this regard, each chain assembly can be taut in between the disks or slightly longer than the distance between the disks such that each chain assembly is flexible or flexes upon contacting the field. As used herein, “taut” may refer to a chain assembly which is substantially straight or not connected to the disks in a manner that allows the chain assembly to concave inwardly, which would create a rounded or mound-like strip of soil. It should be appreciated that if each chain assembly is slightly longer, e.g., by one or two chain-link lengths, than the distance between the disks, the chain assemblies will accordingly create a taller or more rounded strip.

[0023] Referring now collectively to FIGS. 2-4, there is shown an isolated chain assembly which is comprised of multiple double loop, barbed links, which are looped around one another for collectively forming each chain assembly. Each link has a first loop, a second loop that is looped around the first loop, and at least one projection extending outwardly from the first and/or second loops. Since each link has two loops, the links interconnect in a manner wherein the first loop of a respective link wraps or loops around the second loop of an adjacent link, and so forth (FIG. 3). The loops can be offset from one another by a set angle (FIG. 4). For example, the planes in which the loops reside can be offset from one another by approximately 90 degrees, plus or minus 10 degrees. Each projection extends outwardly from and at least partially contacts the loops, respectively. The projections can be offset or form an angle relative to another (FIG. 4). For example, the planes in which projections reside can form an acute angle relative to one another. However, the projections may form any desired angle relative to one another and/or the loops. Each projection may be in the form of a barb or tine. The projections are configured for jetting into the ground in order to break up and loosen the soil. Each link can be a monolithically formed link so that the loops and the projections are integrally formed with one another. Alternatively, the projections may be welded onto the loops, respectively. The links may comprise any desired material, such as metal.
10. The rolling basket assembly of claim 1, further comprising an axle rotatably connected to the bracket and mounting the first disk and the second disk.

11. An agricultural tillage implement for an agricultural vehicle, comprising:
   a frame; and
   at least one rolling basket assembly, comprising:
   a bracket connected to the frame;
   a first disk and a second disk configured for being rotatably connected to the bracket and spaced apart from one another by a distance; and
   a plurality of chain assemblies, and each chain assembly, comprising:
   a first end connected to the first disk and a second end connected to the second disk such that each chain assembly spans the distance between the first disk and the second disk; and
   a plurality of links looped around one another and collectively forming each chain assembly, and each link comprising a first loop, a second loop that is looped around the first loop, and at least one projection extending outwardly from one of the first loop and the second loop.

12. The agricultural tillage implement of claim 11, wherein the plurality of links are looped around one another so that a respective first loop of a respective link is looped around an adjacent second loop of an adjacent link.

13. The agricultural tillage implement of claim 11, wherein the at least one projection of each link comprises a pair of projections respectively extending outwardly from the first loop and the second loop.

14. The agricultural tillage implement of claim 11, wherein the pair of projections respectively extend outwardly from the first loop and the second loop.

15. The agricultural tillage implement of claim 14, wherein each link monolithically formed such that the pair of projections are integrally formed with the first and second loops of each link.

16. The agricultural tillage implement of claim 14, wherein the pair of projections form an acute angle relative to one another.

17. The agricultural tillage implement of claim 14, wherein the pair of projections at least partially contact the first loop and the second loop, respectively.

18. The agricultural tillage implement of claim 11, wherein each disk comprises a plurality of mounting members for mounting the first and second ends of each chain assembly.

19. The agricultural tillage implement of claim 18, wherein the plurality of mounting members are each in the form of a mounting plate configured for receiving a fastener for removably connecting each chain assembly to the first and second disks.

20. The agricultural tillage implement of claim 11, wherein the at least one rolling basket assembly further comprising an axle rotatably connected to the bracket and mounting the first disk and the second disk.

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