HYDRAULIC ARM AND ATTACHMENTS FOR TRACTORS

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ABSTRACT

An auger attachment assembly for tractors and related vehicles. The assembly comprises a telescopic arm with a descending auger device affixed to a distal end thereof, functioning to allow a user to utilize the auger from a convenient sitting position. The invention utilizes hydraulic power, which is achieved by using existing tractor hydraulics, or by installation of a power take-off pump and reservoir on the frame of the implement. In the preferred mode, the arm attaches to the lawn tractor via traditional three-point hitch, though additional attachment means may be utilized. When engaged, the arm telescopes to a desired distance, and can move from left to right at approximately 180 degrees, providing the operator with significant versatility. The auger raises and lowers on a fixed track, which functions to keep the same from "wandering," as is common in the prior art. As such, the invention is particularly suitable for usage in connection with Christmas tree farms, which typically utilize a grid-like growing pattern. Under such circumstances, it is desirable to replace each removed tree in order to maintain the grid pattern, and the present invention allows the operator to do so in an efficient manner previously unachieved.
HYDRAULIC ARM AND ATTACHMENTS FOR TRACTORS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention is an auger attachment assembly for tractors and related vehicles. Specifically, the assembly comprises a telescopic arm with a descending auger device affixed to a distal end thereof, functioning to allow a user to utilize the auger from a convenient sitting position.

[0003] 2. Description of the Prior Art

[0004] Numerous innovations for augers and tractor attachments have been provided in the prior art that are described as follows. Even though these innovations may be suitable for the specific individual purposes to which they address, they differ from the present invention as hereinafter contrasted. The following is a summary of those prior art patents most relevant to the invention at hand, as well a description outlining the differences between the features of the present invention and those of the prior art.

[0005] 1. U.S. Pat. No. 4,682,659, invented by Holopainen, entitled “Ground Piercing Attachment For Tractors”

[0006] The patent to Holopainen describes a ground piercing attachment for a tractor, comprising a bracket which is adapted to be mounted to the lower end of the bucket of a tractor, an elongated bar and connector means for mounting the bar on the bracket so that the longitudinal axis of the bar assumes a vertical position irrespective of the orientation of the tractor so that raising of the bucket enables the bottom end of the bar to be positioned above the ground and subsequent lowering of the bucket causes the bar to be driven into the ground.


[0008] The patent to Karns III describes a hydraulically driven post hole auger apparatus for attachment to implement lifting mechanism of a vehicle. The apparatus includes a cylindrical housing having a speed-reducing gear box therein. The gear box has an output shaft extending through an opening in an end wall of the housing and adapted to have the auger attached thereto. A hydraulic motor in the housing is operatively coupled to the gear box. A universal joint mechanism couples the housing to a support member. The support member may be one end of a boom having its other end pivotally connected to the rear end of a tractor. Linkage connects the boom to the power-actuated lifting levers at the rear of the tractor for selectively raising and lowering the boom and the auger apparatus. The support member alternatively may be a bracket assembly adapted to be removably clamped to an arm of front end loader apparatus, the arm being pivotally connected to a tractor.

[0009] 3. U.S. Pat. No. 4,998,500, invented by Wells, entitled “Horizontal Auger For Skidsteer Tractors And The Like”

[0010] The Wells invention describes an apparatus that is mountable upon a skidsteer tractor, though a forklift truck or similar wheeled vehicle could be employed. The apparatus can be lowered into a trench on one side of a street or sidewalk and used to bore axially beneath the street or sidewalk to a trench on the other side of the street or sidewalk. Operation of the apparatus, which uses conventional commercial augers is controlled from the hydraulic couplings situated in the skidsteer tractor. The apparatus includes a main housing which includes a means for receiving the accessory shoe of a prime mover for physical attachment thereto; and a motor housing with a motor, hydraulic coupler and bearing disposed therein, which motor housing is pivotally mounted to the main body.


[0012] The patent to Gardner describes a vehicle mounted post hole digger for digging post holes in the ground. The vehicle mounted post hole digger includes a spaced apart pair of adjustably extendible support braces with base pivotally coupled to forwards ends of the support braces. A first end of a telescopic boom arm is pivotally coupled to a first end of the base. A motor is pivotally coupled to a second end of the boom arm. The motor has a rotating shaft outwardly extending therefrom to which an elongate auger is attached.

[0013] 5. U.S. Pat. No. 5,868,211, invented by Bohn, entitled “Ball And Socket Mounted Hydraulic Posthole Digger And Method For Using The Same”

[0014] In the patent to Bohn, a portable, hydraulically driven posthole digger is described. The invention is mounted to an existing loader-type tractor or skid steer loader by the use of a ball and socket type attachment such as a trailer ball and trailer tongue apparatus. The tongue is mounted vertically above the post hole digger and the trailer ball is mounted on the loader such as the bucket on a front end loader. The posthole digger’s hydraulic motor is powered off of the existing hydraulic system of the equipment being used. This configuration not only provides an inexpensive method of digging post holes, but further requires a minimal amount of mounting hardware and can be easily removed and stored when not in use.

[0015] 6. U.S. Pat. No. 4,199,033, invented by Van Gundy, Jr., entitled “Augering Accessory For Backhoe Or The Like”

[0016] In the patent to Van Gundy, Jr., an augering apparatus is intended for attachment as an accessory to a hydraulically operated boom of a backhoe or the like, the boom having articulated first and second members, the first member being pivotally attached to a tractor and the second member of the boom having a distal end hydraulically positionable in azimuth, elevation and reach from the tractor, and points of attachment for a scoop or the like. Such scoop is replaced by the accessory which includes a mounting bracket for being carried by transverse pins normally present at the end of the boom for mounting the scoop. The bracket carries a yoke in swiveling relationship for movement about a swivel axis lying in the plane of articulation of the boom members, the yoke having first and second oppositely disposed pivot members. A motor enclosure has pivot cooperative members, preferably trunnions extending from opposite sides thereof, for pivotally cooperating with the yoke. The enclosure contains a selectively reversible hydraulic motor. A coupling for receiving the shank of an auger is carried by a shaft driven by the motor and extends from one end of the enclosure. Hydraulic lines supply hydraulic fluid for operation of the motor, these lines preferably being
connected at the trunnions. The trunnions provide a pivot axis which is offset from the swivel axis for casting action of the motor enclosure in response to augmenting forces.

7. U.S. Pat. No. 5,556,217, invented by Deyo et al., entitled “Auger Mount”

The Deyo et al., invention relates to an auger mount device for coupling an auger to a vehicle such as an excavator, skid steer loader, or the like, having a dipper stick and a bucket link. The auger mount device comprises a mounting plate having a dipper end, an auger end, and a pivot aperture adjacent to the dipper end. The pivot aperture is suitable for mounting the auger mount device to the boom. A fin is attached to the mounting plate. The fin defines a slot suitable for attachment to the bucket link. The auger is mountable to the auger end.

8. U.S. Pat. No. 4,482,084, invented by Caldwell et al., entitled “Trencher”

In the patent to Caldwell et al., disclosed is a trencher machine for attachment to a tractor movably mounted hydraulically for up and down movement relative thereto, boom means for adjusting the depth of the cut in the soil, boom means pivotally mounted on a support means including cutting means thereon.


The Kuzub invention describes a telescopic auger which includes a first drive tube and a second drive member coaxial with the drive tube and slidable inside the drive tube in telescopic manner. A flight is attached to the drive tube in helical arrangement. A second flight section is attached to the drive member at an outer end only of the drive member with the second flight being threaded into the end of the first flight so that rotation of one relative to the other causes the length of the threaded engagement to increase or decrease to allow telescopic adjustment of the length of the total auger flight. This arrangement can be used in a bin sweep which allows the sweep to be adjusted in length to accommodate bins of different diameter. The sweep section is driven across the ground by a drive track at an outer end of the auger section. The auger section is coupled to a main auger section which extends from the center of the bin outwardly to the exterior of the bin by a flexible or rotary joint which allows the sweep section to rotate through 360 degrees during operation. The rotary joint is provided by a flexible auger core to which is attached a plurality of separate collars each carrying a helical flight section. The total drive for the system can therefore be provided by a motor at an outer end of the main auger section.


The patent to Davison describes a heavy duty brush cutting machinery having vehicle mounted brush cutters mounted on a boom extending outwardly from the vehicle. The cutter head assembly is comprised of a generally circular rotary cutter blade, a blade-rotating motor and drive shaft, and a semi-circular cutter blade shroud mounting the motor and the drive shaft. The shroud is comprised of a top deck mounting the blade, motor and drive shaft. The top deck has a first peripheral edge encompassing an obtuse arc, a second segmental edge lying radially outwardly from the first edge and non-radially across the plane of the underlying cutter blade, and a third segmental edge extending from the first edge and intersecting the second edge at an obtuse angle. The shroud includes an anvil cutting edge provided at the leading edge of the top deck’s third segmental edge to sever or dislodge oversized objects from the blade before the object can be carried into the shroud enclosure.

Generally, the prior art patents illustrate various related attachment devices, including telescopic augers used in connection with bin sweeps; horizontally-oriented auger attachments for tractors; and telescopic attachments for tractors featuring implements other than augers (i.e. blades, cutters, and the like). It should be noted that several auger attachment devices found in the prior art relate only to assemblies for usage in connection with back hoes and large trucks.

In contrast to all of the above, the present invention comprises a telescopic arm with a descending auger device to allow a user to utilize the auger from a convenient sitting position. The invention utilizes hydraulic power, by existing tractor hydraulics or power take-off pump and reservoir on the frame of the implement. The arm attaches to the tractor via three-point hitch in the preferred mode, and telescopes to a desired distance, with the ability to move from left to right at approximately 180 degrees. The auger raises and lowers on a fixed track for the purposes of stability, thereby providing compact assembly that is effective for Christmas tree growing and a host of additional purposes.

SUMMARY OF THE INVENTION

As noted, the present invention is an auger attachment assembly for tractors and related vehicles. Specifically, the assembly comprises a telescopic arm with a descending auger device affixed to a distal end thereof, functioning to allow a user to utilize the auger from a convenient sitting position. To accomplish the foregoing, the invention utilizes hydraulic power, which is achieved by using existing tractor hydraulics, or by installation of a power take-off pump and reservoir on the frame of the implement.

In the preferred mode of production, the arm attaches to the tractor via traditional three-point hitch, though additional attachment means may be utilized. When engaged, the arm telescopes to a desired distance, and can move from left to right at approximately 180 degrees, providing the operator with significant versatility. Importantly, the auger raises and lowers on a fixed track, which functions to keep the same from “wandering,” as is common in the prior art.

As such, the invention is particularly suitable for usage in connection with Christmas tree farms, which typically utilize a grid-like growing pattern. Under such circumstances, it is desirable to replace each removed tree in order to maintain the grid pattern, and the present invention allows the operator to do so in an efficient manner previously unachieved.

However, it must be noted that the assembly of the present invention may be utilized for a variety of additional purposes. Specifically, additional implements besides the auger may be affixed to the telescopic arm for the purpose of performing other tasks. In such enhanced embodiments, the user may remove the auger and attach a different tool, such as by pin and hydraulic “quick connect” means.
[0031] According to all of the foregoing, it is an object of the present invention to provide a particular assembly that may be easily retrofitted to previously existing vehicles, including agricultural tractors and other machines.

[0032] It is also an object of the invention to provide an assembly that may attach to such vehicle through a variety of means, according to manufacturer preferences and user needs.

[0033] It is a further object of the present invention to provide an assembly that may be conveniently operated from a sitting position, such as through the usage of multiple levers mounted in the proximity of the user in a previously determined location.

[0034] It is an additional object of the invention to provide an auger that engages the ground in a previously determined range of depth to meet user needs.

[0035] Likewise, it is an additional object of the invention to provide a hydraulic arm that extends from the vehicle to a previously determined length, for the utmost in versatility.

[0036] Furthermore, it is an object of the invention to provide an auger device that travels along a fixed track, rendering the same inherently more stable than augers disclosed in the prior art.

[0037] The novel features which are considered characteristic for the invention are set forth in the claims. The invention itself, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of the embodiments when read and understood in connection with accompanying drawings.

BRIEF DESCRIPTION OF PREFERRED EMBODIMENTS

[0038] FIG. 1 is a side perspective view of the present invention, apart from a vehicle, including arrows to indicate the path of movement of principal components thereof;

[0039] FIG. 2 is a side perspective view of the present invention, installed upon a vehicle, including arrows to indicate the path of movement of components, including left and right swing movement, shown with the auger in digging position;

[0040] FIG. 3 is a plan view of the hydraulic arm and auger controls in the preferred mode, shown for the purposes of example only.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0041] Referring to FIG. 1, which is a side perspective view of the present invention, apart from a vehicle, including arrows to indicate the path of movement of principal components thereof, and FIG. 2, which is a side perspective view of the present invention, installed upon a vehicle, including arrows to indicate the path of movement of components, including left and right swing movement, shown with the auger in digging position; and FIG. 3, which is a plan view of the hydraulic arm and auger controls in the preferred mode, shown for the purposes of example only.

[0042] Generally, disclosed is the hydraulic arm and attachment assembly (10) for usage upon vehicles. Regardless of such vehicles, though the invention is especially effective for usage in conjunction with small agricultural tractors (12) as illustrated in FIG. 2, the assembly may also be removably affixed to a host of other machines.

[0043] In the instance of usage upon a tractor (12), the assembly may utilize a three-point hitch frame (14), as shown in the FIGURES noted above, extending from the back of the tractor.

[0044] Regardless of the means by which the assembly is attached to the vehicle, the present invention comprises a first hydraulic motor (16), the general location of which is depicted in the FIGURES for the purposes of example only. The motor (16) functions to rotate hydraulic arm (20), with first hydraulic cylinder (18) powered by a pump or existing tractor power means. Both the hydraulic cylinder (18) and hydraulic arm (20) are oriented horizontally, or parallel to the ground surface. Hydraulic arm (20) functions to extend outwardly from the vehicle (12) to a previously-determined length in a telescopic manner.

[0045] Located upon a distal end of the hydraulic arm (20) is a vertical fixed track (22), engaging the hydraulic arm (20) in a generally perpendicular orientation. The fixed track (22) comprises a hydraulic motor (24) thereon, the general location of which is also depicted in the FIGURES for the purposes of example only. The fixed track (22) further comprises a hydraulic cylinder (26) which is affixed to an auger (28). Like the track (22), the hydraulic cylinder (26) and auger (28) are oriented vertically, or perpendicular to the ground surface.

[0046] Auger (28) functions to extend downwardly from the vehicle (12), allowing for digging into a ground surface. The auger may be one of a variety of sizes for such purpose.

[0047] To initiate all of the foregoing, the user engages a previously-determined quantity of arm and auger controls (30), which are generally located in the proximity of a dashboard of the vehicle in question. In the preferred mode, the assembly utilizes a total of four user controls for movement of the hydraulic arm and auger. As previously indicated, through usage of such principal components, the present invention allows the user to effectively control an auger from a seated position of an agricultural tractor or the like.

[0048] It is important to note that the hydraulic arm rotates left and right in a range of one hundred eighty degrees in the preferred mode of production. Therefore, the telescopic member extends from either the left side or the right side of the vehicle diagonally, providing the user the utmost in versatility. Such is particularly helpful when the present invention is used for tree plantations, where the operator likely needs to utilize the auger on both sides of the tractor.

[0049] Moreover, as noted above, the hydraulic arm extends to a previously-determined length. Importantly, the degree to which the arm extends is selected by the user based upon the location of intended holes in the instance of auger
usage, or other locations where additional implements are used. Should the assembly of the present invention be utilized in conjunction with tree plantations in a grid pattern, a regular user thereof may extend the arm to a particular preset distance that is common to such application.

Similarly, regarding the depth to which the auger engages the ground, a regular user of the assembly may lower the auger to a particular preset depth that is also common to such usage. Importantly, regarding safety considerations, the auger may be fixed in a raised position during travel of the tractor or other vehicle.

Regarding the versatility of the assembly, existing vehicle hydraulics may provide sufficient power for all operations. However, it should also be noted that the assembly may utilize a power take off means which comprises a pump and reservoir on a frame of the assembly, as is known in the art.

As noted, in the preferred mode, the assembly is affixed to a small agricultural tractor and used in conjunction with tree plantations grown in a grid pattern, wherein chosen and cut trees are replaced through usage of the assembly and auger.

It is important to note that the assembly may be utilized for a variety of additional purposes. Specifically, additional implements besides the auger may be affixed to the telescopic arm for the purpose of performing other tasks. In such enhanced embodiments, the user may remove the auger and attach a different tool, such as by pin and hydraulic "quick connect" means.

With regards to all descriptions and graphics, while the invention has been illustrated and described as embodied, it is not intended to be limited to the details shown, since it will be understood that various modifications, substitutions and changes in the forms and details of the device illustrated in its operation can be made by those skilled in the art without departing in any way from the spirit of the invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can readily adapt it for various applications without omitting features that, from the standpoint of prior art, constitute essential characteristics of the generic or specific aspects of this invention. What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

What is claimed is:

A hydraulic arm and attachment assembly removably affixed to a vehicle, comprising:

- a power means which functions to power a first hydraulic cylinder, the first hydraulic cylinder affixed to a hydraulic arm, the hydraulic cylinder and hydraulic arm oriented horizontally, parallel to a ground surface, the hydraulic arm functioning to extend outwardly from the vehicle in a telescopic manner;
- a vertical fixed track located upon a distal end of the hydraulic arm, the fixed track engaging the hydraulic arm in a generally perpendicular orientation, the fixed track comprising a hydraulic motor thereon, the fixed track further comprising a hydraulic cylinder thereon;
- the hydraulic cylinder affixed to an auger, the hydraulic cylinder and auger oriented vertically, perpendicular to a ground surface, the auger functioning to extend downwardly from the vehicle, allowing for digging into a ground surface; and
- a plurality of arm and auger controls located in the proximity of a dashboard of the vehicle, functioning to allow the user to engage the controls for movement and control of the hydraulic arm and auger from a seated position of the vehicle.

The hydraulic arm and attachment assembly as described in claim 1, wherein the hydraulic arm rotates left and right in a range of one hundred eighty degrees.

The hydraulic arm and attachment assembly as described in claim 1, wherein the hydraulic arm extends to a previously-determined length.

The hydraulic arm and attachment assembly as described in claim 1, wherein the auger extends downwardly to a previously-determined depth.

The hydraulic arm and attachment assembly as described in claim 1, wherein existing vehicle hydraulics provide power to the assembly.

The hydraulic arm and attachment assembly as described in claim 1, wherein the assembly utilizes a power take off means comprising a pump and reservoir on a frame of the assembly.

The hydraulic arm and attachment assembly as described in claim 1, wherein the auger is removably affixed to the assembly through usage of pin and hydraulic quick connections.

The hydraulic arm and attachment assembly as described in claim 1, wherein the assembly is retrofitted to previously existing vehicles.

The hydraulic arm and attachment assembly as described in claim 1, wherein the auger width is a diameter of four inches.

The hydraulic arm and attachment assembly as described in claim 1, wherein the assembly utilizes a total of four user controls for movement of the hydraulic arm and auger.

The hydraulic arm and attachment assembly as described in claim 1, wherein the auger is removed from the assembly and replaced with additional previously-determined implements.

The hydraulic arm and attachment assembly as described in claim 1, wherein the vehicle to which the assembly is affixed is an agricultural tractor.

The hydraulic arm and attachment assembly as described in claim 1, wherein the assembly is affixed to a small agricultural tractor and used in conjunction with tree plantations grown in a grid pattern, wherein chosen and cut trees are replaced through usage of the assembly and auger.