DEEP-LAYER SOIL IMPROVEMENT TILLAGE DEVICE FOR SALINE-ALKALI LAND

Technical Field

The invention relates to the field of agricultural technology, and more particularly to a deep-layer soil improvement tillage device for saline-alkali land.

Background Art

Tillage machinery is agricultural implements used to process the topsoil and provide soil conditions for crop emergence and growth. It is mainly divided into two categories: basic tillage machinery and topsoil tillage machinery.

Existing tillage machinery for saline-alkali land mostly uses rigid bolt connections or welding for its tillage components. Disassembling and assembling these components requires tools to remove each bolt or cut the weld points, which is time-consuming and labor-intensive, and makes it impossible to quickly replace components with suitable ones based on the characteristics of saline-alkali soil.

Summary of the Invention

To overcome the above shortcomings, this invention provides a deep-layer soil improvement tillage device for saline-alkali land, aiming to improve the problem of time-consuming and labor-intensive disassembly.

To achieve the purposes mentioned hereinabove, the invention provides the following technical solution: a deep-layer soil improvement tillage device for saline-alkali land, comprising a vehicle body, wherein fixing blocks are provided inside the vehicle body; a handle is provided on an outer surface of the fixing block; pull ropes are fixedly provided on two ends of the handle; limiting rods and fixing rods are slidably connected to outer surfaces of the pull ropes; springs are sleeved on the pull ropes; clamping blocks are fixedly connected to one end of the pull ropes; a replacement assembly is provided on an outer surface of the vehicle body.

Through the above technical solution, the handle supported by the fixing blocks is linked to drive the pull rope, and the pull ropes are guided by the limiting rods and the fixing rods to enable the clamping blocks to be rapidly locked or unlocked, thereby achieving rapid assembly and disassembly of the tillage assembly.

Preferably, the replacement assembly comprises a fixing frame; the fixing frame is provided on an outer surface of the vehicle body; sliding blocks are slidably connected to an inner surface of the fixing frame; front shovels are fixed to outer surfaces of the the sliding blocks.

Preferably, the handle is provided on a top of the fixing frame.

Preferably, sliding grooves adapted to the sliding blocks are formed in an inner surface of the fixing frame; the sliding blocks are slidably connected to inner walls of the sliding grooves.

The invention has the following beneficial effects:

In the invention, rapid assembly and disassembly of the tillage assembly are achieved through an elastic linkage and a limiting structure, without requiring nuts or bolts for tool installation, thereby saving time and labor while adapting to improvement requirements for different saline–alkali soil conditions.

In the invention, the replacement assembly enables rapid replacement and precise installation of the tillage shovel, ensuring stable motion trajectories of the shovel body during the tillage process, improving the uniformity of deep soil improvement, and enhancing the flexibility of the equipment in adapting to different improvement scenarios.

Brief Description of the Drawings

FIG. 1 is a stereoscopic schematic view of a deep-layer soil improvement tillage device for saline-alkali land provided by the invention.

FIG. 2 is a stereoscopic sectional schematic view of a deep-layer soil improvement tillage device for saline-alkali land provided by the invention.

FIG. 3 is a stereoscopic schematic view of a deep-layer soil improvement tillage device for saline-alkali land provided by the invention.

FIG. 4 is a stereoscopic schematic view of a deep-layer soil improvement tillage device for saline-alkali land provided by the invention.

In the drawings, 1 refers to the vehicle body, 2 refers to the fixing block, 3 refers to the handle, 4 refers to the pull rope, 5 refers to the limiting rod, 6 refers to the fixing rod, 7 refers to the spring, 8 refers to the clamping block, 9 refers to the fixing frame,

10 refers to the front shovel, 11 refers to the sliding blocks.

Specific Embodiment of the Invention

The technical solutions of the embodiments of this invention will be clearly and completely described below with reference to the accompanying drawings. Obviously, the described embodiments are only some embodiments of this invention, and not all embodiments. Based on the embodiments of this invention, all other embodiments obtained by those skilled in the art without creative effort are within the protection scope of this invention.

Referring to FIG. 1 to FIG. 4, one embodiment of this utility model is provided: a deep-layer soil improvement tillage device for saline-alkali land, comprising a vehicle body 1, wherein fixing blocks 2 are provided inside the vehicle body 1; a handle 3 is provided on an outer surface of the fixing block 2; pull ropes 4 are fixedly provided on two ends of the handle 3; limiting rods 5 and fixing rods6 are slidably connected to outer surfaces of the pull ropes 4; springs 7 are sleeved on the pull ropes 4; clamping blocks 8 are fixedly connected to one end of the pull ropes 4; a replacement assembly is provided on an outer surface of the vehicle body 1.

Specifically, when it is necessary to adapt to different degrees of soil compaction in saline–alkali land or to adjust the improvement depth, an operator operates the handle 3 provided on the outer walls of the fixing blocks 2, so as to drive the pull ropes 4 at both ends to slide along the limiting rods 5 and the fixing rods 6. During the movement of the pull ropes 4, the springs 7 sleeved on the outer wall are compressed synchronously, thereby pulling the clamping blocks 8 at one end to unlock or reset the tillage assembly. In this manner, the tillage assembly can be rapidly disassembled and replaced without additional tools, shortening preparation time for operation. Meanwhile, an elastic characteristic of the springs 7 effectively buffers rigid resistance transmitted from soil during tillage, preventing deformation or fracture caused by rigid collision between components, and enabling adaptation to improvement requirements of different saline–alkali land conditions.

Referring to FIG. 3, the replacement assembly comprises a fixing frame 9; the fixing frame 9 is provided on an outer surface of the vehicle body 1; sliding blocks 11

are slidably connected to an inner surface of the fixing frame 9; front shovels are fixed to outer surfaces of the the sliding blocks 11.

Specifically, the fixing frame 9 serves as a mounting and supporting base for the front shovels 10, and a reserved adaptive structure on an inner wall thereof provides a precise sliding track for the sliding blocks 11. The front shovels 10 are rapidly assembled with the fixing frame 9 through the connection with the sliding blocks 11. Such a sliding-type connection does not require complex tools, and positioning and fixation of the front shovels 10 may be completed merely by pushing the sliding blocks 11 along a corresponding track on the inner wall of the fixing frame 9. During disassembly, the front shovels 10 may be removed by sliding in the reverse direction, enabling switching between different shovel types according to actual requirements of deep improvement in saline–alkali land, and enhancing the practicality of the equipment in saline–alkali soil improvement operations.

Referring to FIG. 1, the handle 3 is provided on a top of the fixing frame 9.

Specifically, the operator can manipulate the mechanism without bending over, so as to rapidly actuate the linkage structure to complete disassembly and assembly of the tillage component, thereby facilitating timely adjustment.

Referring to FIG. 1, sliding grooves adapted to the sliding blocks 11 are formed in an inner surface of the fixing frame 9; the sliding blocks 11 are slidably connected to inner walls of the sliding grooves.

Specifically, the sliding grooves adapted to the sliding blocks 11 allow the sliding blocks 11 to slide along inner walls of the sliding grooves without jamming, thereby providing a positioning reference for installation of the front shovels 10. The front shovels 10 are more securely connected to the mounting frame 9 through the sliding blocks 11, and the sliding grooves further provide rigid limiting for the sliding blocks 11 during tillage operation, so as to constrain a motion trajectory of the front shovels 10 and prevent lateral deviation or wobbling of the front shovels 10 caused by uneven soil resistance in saline–alkali land.

Operating principle: when the tillage component needs to be assembled or disassembled, an operator manipulates the handle 3 to drive the pull ropes 4 to move.

The pull ropes 4 slide along the limiting rods 5 and the fixing rods 6 while compressing the springs 7 on an outer sidewall, and pulls the clamping blocks 8 to release a limiting engagement with a replacement component, thereby achieving rapid separation or connection between the tillage component and the fixing blocks 2 on the vehicle body 1.

During installation of the replacement component, the sliding blocks 11 are aligned with the sliding grooves and pushed therein to rapidly fix the front shovels 10. During disassembly, the sliding blocks 11 are slid in a reverse direction along the sliding grooves to remove the front shovels 10.

Finally, it should be noted that the above description is only a preferred embodiment of the invention and is not intended to limit the invention. Although the invention has been described in detail with reference to the foregoing embodiments, those skilled in the art can still modify the technical solutions described in the foregoing embodiments or make equivalent substitutions for some of the technical features. Any modifications, equivalent substitutions, improvements, etc., made within the spirit and principles of the invention should be included within the protection scope of the invention.