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(54) Title: HOOK FOR FIXING PLANTS

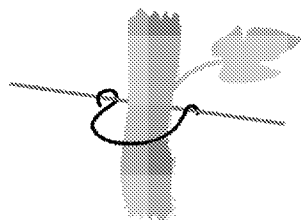


Fig. 3

(57) Abstract: This patent application describes a new hook for fastening plants. The hook has a unique structure that allows quickly, conveniently, and efficiently fasten plants to a support. The main characteristic of the invention is that the plane of one side loop is aligned with the plane of the hoop, while the other loop is left perpendicular to the loop which supports the plant stem. Thus, the hook stays in a fixed position on the wire. The hook is easy to fasten and unfasten and can be used with wires of different thicknesses. The hook is reusable. The invention also offers various modifications that allow you to attach several plant stems or fasten bushes by separating branches. This invention will benefit agricultural professionals and provide a simple and effective solution for fastening plants.



HOOK FOR FIXING PLANTS

TECHNICAL FIELD

The invention belongs to the field of agricultural devices, more precisely to that of support elements for fixing the stem of plants.

TECHNICAL LEVEL

Certain plants must be secured to a stable support, as strong winds or rains can damage them. This problem is usually solved by tying the plant to a support post driven into the ground. This solution requires a lot of time and labour, and a tightly tied string can damage the plant and hinder its growth. This problem is solved in different ways. The utility model CN216701083U describes S-shaped hooks for attaching plants without damaging the stem. However, such hooks can easily become unhooked. In addition, the hooks described in CN216701083U must be attached to a special support device, which complicates their use. The closest analogue of the product described in this application is the Okuyonic brand hooks for plant attachment (https://www.amazon.com.be/-/en/Okuyonic-Plastic-Grape-Grafting-Support/dp/B095QKJQN6?language=en_GB).

Okuyonic hooks have two parallel side loops to attach the hook to the wire and a loop between the two parallel side loops to hold the plant stem in place. The plane of the hoop is perpendicular to the planes of the parallel side loops. Such a construction has several disadvantages. First, the parallel side loops do not allow the hook to be fixed to the wire, i.e. the hook may move. Secondly, such hooks can only be used for a limited thickness of wire.

BRIEF DESCRIPTION OF THE INVENTION

In order to solve the problems of the closest analogue mentioned above, the plane of one side loop was aligned with the plane of the hoop, while the other side loop was left perpendicular to the hoop. When attaching such a hook, there are forces that oppose the deformation of the hook, which act on the wire and firmly fix the hook thus keeping it in one place as shown in Fig. 1 and Fig. 2. In position **a**, the hook hangs

freely on the wire. When bending the hook upwards in position **b**, the size of the loop and the thickness of the wire do not allow the hook to bend freely anymore. As the hook continues to bend, there are forces resisting the bending, which act on both the wire and the hook (Figure 1). When the hook is placed in position **c**, the aforementioned forces hold the hook in place, preventing it from unhooking and moving along the wire (Figure 2). The plant is held as shown in Fig. 3. When the hook is fastened, it is held firmly in place by the forces acting on the wire, preventing easy movement along the length of the wire. In addition, the hook is reusable, so it can be left hanging and reused when needed. The use of such hooks not only saves resources, but it also eliminates the need to collect and dispose of waste unlike other methods of pinning and tying plants.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows three positions of the hook in relation to the wire.

Fig. 2 shows the opposing forces acting on the wire and the hook when the hook is in the hooked position.

Fig. 3 shows how the plant is held by the hook described in the description of the invention.

Fig. 4 shows how the use of several fixing elements results in an adjustable size hoop.

Fig. 5 shows a hook that can be used to fasten the stems of several plants.

Fig. 6 shows a hook that can be used to fasten a bush while separating branches.

Fig. 7 shows how hooks can be used to attach larger hoops.

Fig. 8 shows the attachment of the hook to a vertical wire.

Fig. 9 shows the attachment of the hook when the hook forms an inclined crossbar.

Fig. 10 shows the attachment of the hook to two wires perpendicular to each other.

Fig. 11 shows a hook for securing T-wire intersections.

Fig. 12 shows a hook with the upper part bent downwards for securing T-wire intersections where the upper part of the wire is very short.

Fig. 13 shows hook of Fig. 12, which is attached from the opposite side.

DETAILED DESCRIPTION OF THE INVENTION

It has been observed that as the thickness of the plant stem approaches the size of the hoop, hooks with two loops become difficult to unhook. As a result, the hook has been improved and instead of a second loop, an open L-bend has been used, making it easier to unhook the hook when attaching plants with thicker stems. Such a hook has several essential advantages that make it particularly convenient and efficient to use. The hook is easy to fasten and unfasten, which is especially important when you need to secure a large number of plants. It can be easily released with one hand when the thickness of the plant approaches the size of the hoop. The hook can also be used with wires of various thicknesses. The hook is free when not fastened (just hooked on the wire), so it can easily be moved as needed. The hook can be easily fastened in any direction and from any side of the wire. In order to make it more convenient to fasten, instead of the L-shaped fold, other fasteners, such as balls, can be used, as shown in Fig. 4. Also, the fastener can be a cube or other shape that allows the hook to be fixed in place. In addition, the hook can have an adjustable loop size (Fig. 4), secure several plant stems with one hook (Fig. 5), secure a bush by separating branches (Fig. 6), use fasteners with the break mode for larger hoops (Fig. 7). If it is necessary to fix the stem of the plant perpendicular to the wire, then a modified hook (Fig. 8) is used, which replaces the stretched wire, and a suitable hook from the previous drawings is attached to it. An inclined crossbar can additionally be made (Fig. 9). The hoops can be used when connecting wires perpendicular to each other (Fig. 10). The invention was tested in making small wire seedbeds when it was used to connect and strengthen perpendicularly intersecting joints (Fig. 10). When using these hooks for wire seedbeds, there was a problem with T-joints, as this type of hook fixes all four ends of the intersecting wires. The hook shown in Figure 10 was reshaped by bringing the upper part to the point of intersection of the wires being fixed together (Fig. 11). Then, the upper part of the hook was bent down leaving the lateral protrusions (Fig. 12). Such a hook is fixed using three parts of intersecting wires, and the fourth can be left as short as possible. The parts of the hook and the wires may overlap in a different manner from that shown in Fig. 12 (Fig. 13). The main purpose of the invention is quickly, simply and economically fastening plants to stretched wire. This invention will be useful to everyone who

grows plants and will facilitate the tying and fastening of plants. The hooks are durable and reusable.

CLAIMS

1. A hook for fastening plants to a wire or for seedbeds and made of rigid material, comprising:
 - a) a hoop;
 - b) a first lateral fastener with a plane coinciding with the plane of the hoop;
 - c) the second lateral fastener;**characterised** in that the plane of the second lateral fixator is perpendicular to the plane of the hoop; and
the first and second side are arranged in such a way that when the hook is hung, a force resisting deformation occurs, which ensures a stable hold of the hook on the wire.
2. The hook according to claim 1, wherein the first and second fasteners are loops.
3. The hook according to claim 1, wherein one of the fasteners is an L-shaped bend to allow easy unhooking of the hook when fastening plants with thicker stems.
4. The hook according to claim 1, in which at least one the fastener is a ball, cube or other shape that allows the hook to be fixed to the wire.
5. The hook according to any one of claims 1-4, which has one or more fasteners at the end of the hoop to allow changing the size of the hoop.
6. The hook according to claims 1-5, wherein the loop of the hook has one or more bends, due to which the hoop forms two or more half-moons, allowing several plant stems to be fastened separately.
7. The hook according to claims 1-6, which is made of plastic or metal.

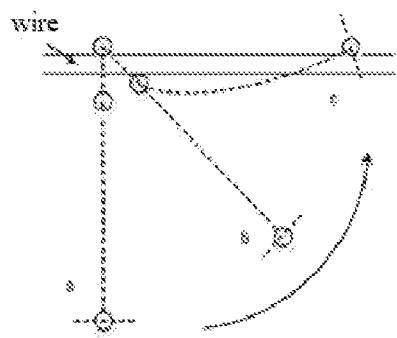


Fig. 1

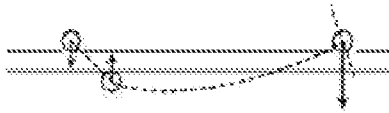


Fig. 2

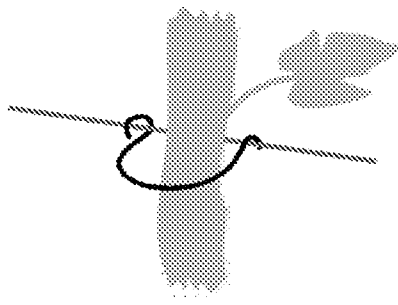


Fig. 3

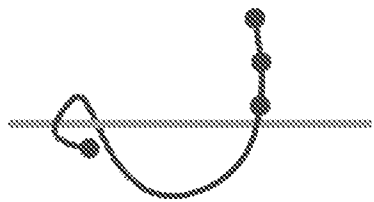


Fig. 4

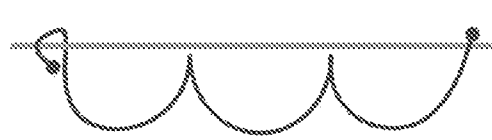


Fig. 5

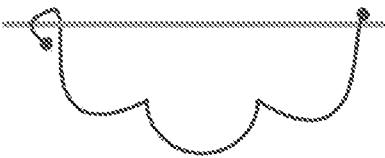


Fig. 6

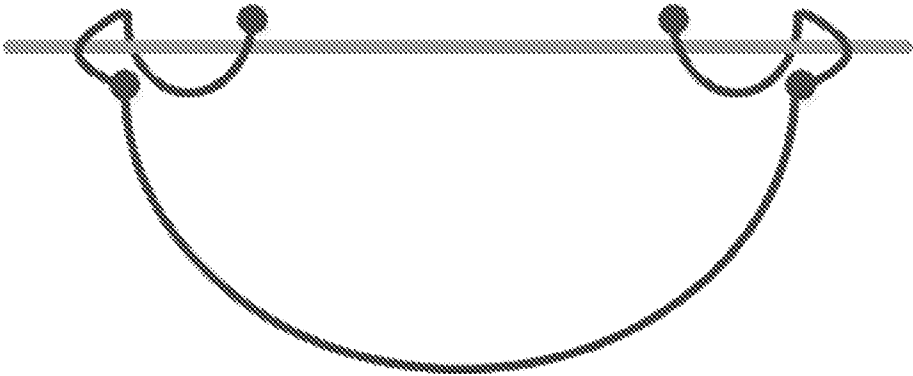


Fig. 7

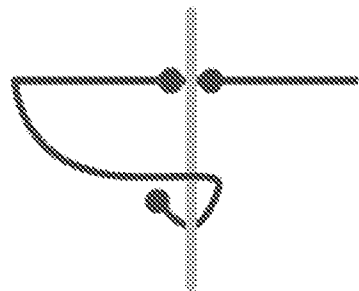


Fig. 8

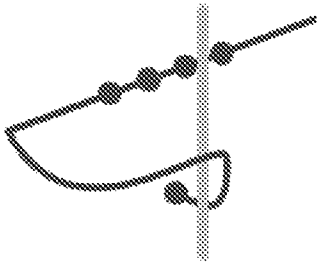


Fig. 9

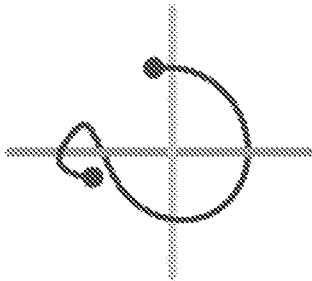


Fig. 10

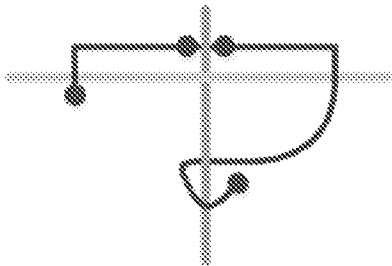


Fig. 11

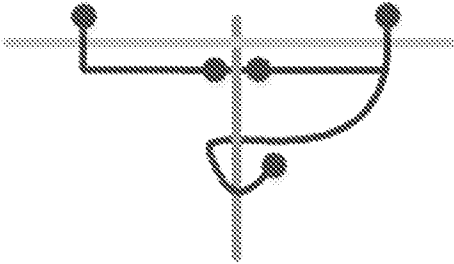


Fig. 12

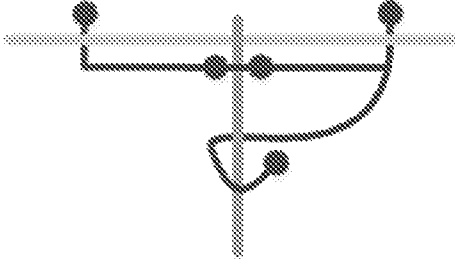


Fig. 13

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. A01G9/12 A01G17/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CH 184 214 A (FELLMANN JOSEF [CH]) 31 May 1936 (1936-05-31)	1-3,7
Y	column 1 line 19 to column 2 line 7 column 2 lines 13-14; figures 2,3	4-6
X	US 6 254 049 B1 (GOEHLY LUDWIG W [CA]) 3 July 2001 (2001-07-03) abstract; figures 1,3	1
Y	AU 13536 83 A (DEUTSHER PTY LTD) 27 October 1983 (1983-10-27) page 5 line 29 to page 6 line 8; figure 6	4



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

19 August 2024

Date of mailing of the international search report

09/09/2024

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2024/055732

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	KR 101 849 614 B1 (IM JONG HO [KR]) 17 April 2018 (2018-04-17) paragraph [0025]; figure 9 -----	6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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