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(54) **Title**: DEVICE AND METHOD FOR MAKING BRANCHE BUNDLES

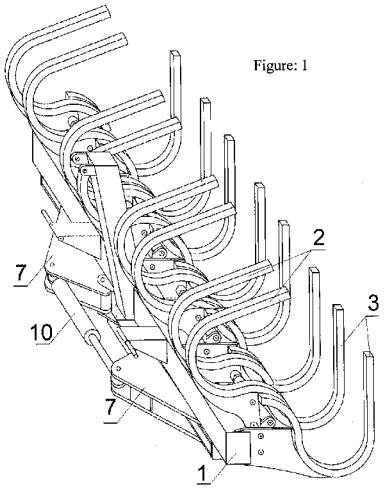


Figure: 1

(57) **Abstract**: The subject matter is a brushwood bundling device, primarily for use as a three-point tractor attachment, consisting of a frame (1) that holds pressing tong assemblies (2, 3), and a tensioning lever assembly (7), where the upper pressing tong assemblies (2) evenly press the loaded wood in the fixed lower tongs (3) together regardless of the quantity of material supplied to the individual assemblies (2, 3). The pressing force is carried out by means of a tensioning element (10) and tensioning levers (7), which evenly distribute the tensile force on individual pressing assemblies by means of a distribution balance (9), thus achieving an identical level of force on all pressing assemblies. The complete pressing mechanism assembly is designed so that one third of the stroke of the tensioning element (10) is needed for approximately two thirds of the stroke of the pressing tongs (2), whereas the remaining two thirds of the stroke are used for the last one third of the stroke of the pressing tongs (2).

DEVICE AND METHOD FOR MAKING BRANCHE BUNDLES

Subject matter

The subject matter is a brushwood bundling device, primarily for use as a tractor attachment, which enables the fast and simple creation of brushwood bundles composed of any suitable type of wood in any environment, even in a forest.

Technical problem

The technical problem that is solved by this device is the designing of a tractor attachment that can enable the fast and simple collecting of brushwood bundles where the material, primarily branches and twigs, does not have to be prearranged and cut to the final length of the bundles, while utilizing minimal tractor power at optimum performance.

Previous state of technology

Such devices have not been employed yet, and the forming of bundles is still considered manual work. As accessories, several manual tools are available, but they are merely used as aides for arranging already-cut twigs/branches and for easier binding into sheaves. Alternately,

there are machines for forming large bundles for industrial heating applications, but these are unsuitable for individual use.

Research has shown that a device is necessary that would be available for individual users with tractors of up to 35kW of power, which is generally the most common range.

Solution to the technical problem

The aforementioned technical problem has been solved with a newly invented device whose main feature is a structural design that allows for the forming of bundles made of suitably thick branches/twigs, which are evenly pressed together by the device, regardless of the quantity of wood that is supplied to the individual tong assemblies. A power saw cuts individual portions that are bundled together with a string or suitable tape.

The next essential feature of the newly invented device is the fact that only one tensioning element – primarily a hydraulic cylinder – is used. This is due to the structural design of the device, which is powered by the tractor's hydraulics. By changing the length of the tensioning elements by means of levers, it presses all portions together, during which it opens and closes the tongs of the device.

The key feature is the design of the pressing mechanism of individual assemblies, allowing for minimum force at maximum load, i.e. the necessary squeezing force of the tongs is inversely proportional to the

force of the hydraulic cylinder lever assembly.

The particular design of the device, the engineering element, and the pressing mechanism, allows for the light weight of the device and less need for hydraulic oil, which relieves the load on the tractor or the power unit.
Consequently, an affordable price can also be achieved.

The essentials of the invention are described in more detail below, including the description of the implementation, and drawings, depicting the following:

Figure 1: side view of the brushwood bundling device
Figure 2: ground plan with the design of the tensioning element
Figure 3: open and closed pressing mechanism in a transverse cross-sectional view

The brushwood bundling device, primarily as a three-point tractor attachment, consists of a frame 1 that holds pressing tongs 2, 3. Tongs 2 open and close by means of the pressing mechanism 4, 5, 6, which is attached to the pressing tongs 2, 3 and the tensioning lever 7. The latter holds the distribution balance 9.

The pressing mechanism assembly is made of a pair of upper pressing tongs 2, and a pair of lower pressing tongs 3. The pressing mechanism assembly is made of a pair of lever assemblies of the pulling/pressing

mechanism 4, a pair of lever assemblies of the pulling mechanism 5, and the handle of the pulling mechanism lever assembly 6. The two pressing tong assemblies, acting as one another's counterforce, are connected by the distribution balance 9.

The device is opened when the tensioning element 10 (primarily a hydraulic cylinder) extends and rotates the tensioning lever 7 towards frame 1 pushing the pressing mechanism handle 6 via the distribution balance 9, thus opening the pressing tongs 2 on axle 13. Now the device is ready for use.

Branches/twigs (primarily wood waste) that exceed the length of the assembly on either side are loaded into the opened pressing tongs 2, 3.

The pressing operation is executed by means of the two-way tensioning element 10, which pulls the distribution balance 9 via the tensioning lever 7. The distribution balance 9 distributes the pulling force of the tensioning element 10, whereas the second pair of pressing tongs 2, 3, distribution balance 9, and the tensioning bracket 7 serves as a counterforce. That way, the pressing force of the complete upper pressing tong assembly 2 is evenly distributed by means of only one tensioning element 10 regardless of its position, which depends on the diameter of the bundle.

The pressing mechanism 4, 5, 6 is designed to rotate the upper pressing tongs 2 out of their open position 11 into the position in

which the pressing process of the wood waste, primarily twigs/branches, begins. This position is located approximately two thirds of the stroke into the closed position 12 of the pressing tongs 2. The latter means that for the whole stroke of the upper pressing tongs 2, where no force has to be used, approximately one third of the stroke of the tensioning element 10 is used.

In the position where the pressing process begins, the pressing handles 4, 5 allow for the inverse proportion of the pulling force of the distribution balance 9 in relation to the force executed upon the pressing tongs 2, 3. Here, the remaining two thirds of the tensioning element 10 stroke are used – the tensioning element executes one third of the stroke of the upper tongs 2 by means of the pressing mechanism 4, 5, 6. The latter enables a greater pressing force on the loaded wood waste with regard to the relatively small tensioning element 10.

By achieving a pressing force upon the loaded wood waste, the sheaf is cut by a power saw between both pairs of pressing tongs 2, 3 and shortened on either side. Longer bundles can also be formed by not cutting every portion of the loaded material. The next step is tying the bundles with string or suitable tape, followed by the opening stroke of the tongs, and the ejection of the bundle.

Optionally, an available wood cutting machine or an available binder of string/tape/binding material can be installed on the device.

It is safe to state that a suitably trained person can achieve any bundle length by rearranging pressing tongs 2, 3, or any bundle diameter by curving pressing tongs 2, 3, or adding another pair of pressing tongs 2, 3 without bypassing the novelty of the invention. The device also does not have to be necessarily operated as a tractor attachment, where the hydraulic system of the tractor is primarily used. Instead, it can be used as a stand-alone device (also as a towed device) which uses its own power source or any other feature for the tensioning element, enabling comparable pressing and tensile forces.

Patent claims

1. A brushwood bundling device, primarily for use as a tractor attachment, made of a frame (1), primarily adapted to a tractor as a 3-point hitch and as an attachment for the hydraulic system of the tractor, **characterized by** the assemblies of pressing tongs (2, 3) that significantly reduce the necessary force of the tensioning element (10) via the pressing mechanism (4, 5, 6), and at the same time enable a linear path of the distribution balance (9), installed on the tensioning levers (7).

2. A brushwood bundling device according to Claim 1 **characterized by** the design using only one tensioning element (10), which enables an even force on the four assemblies of pressing tongs (2, 3) via the tensioning lever (7) and the distribution balance (9) regardless of the position of the upper pressing tongs (2).

3. A brushwood bundling device according to Claim 1 **characterized by** the design where the structure of the device and its individual pressing tong assemblies (2, 3) is designed to ensure an opening between individual pressing assemblies for cutting the pressed material, in which case the complete pressing mechanism is located at the front of the brushwood bundling device.

4. A brushwood bundling device according to Claim 1 **characterized by** the design where the pressing mechanisms (4, 5, 6), necessary for pressing wood waste, are concealed in the pressing tong assembly (2, 3), whereas they do not reach into the area of pressing tong curves (2, 3).

5. A brushwood bundling device according to Claim 1 **characterized by** the design, where the lower pressing tong assemblies (3) are fixed to the frame (1), and upper pressing tong assemblies (2) rotate on the axle (13).

6. A brushwood bundling device according to Claim 1 **characterized by** the design of one, two, three, four, or more pressing tong assemblies (2, 3).

7. A brushwood bundling device according to Claim 1 **characterized by** the design of a pre-installed commercially available cutting machine, necessary for cutting through individual portions of material.

8. A brushwood bundling device according to Claim 1 **characterized by** the design of a pre-installed commercially available binder of string/tape/binding material.

9. The brushwood bundling device is **characterized by** the feature that it enables the creation of bundles by loading wood waste into opened tongs (2, 3), where the tongs (2, 3) serve as a bracket for loading twigs/branches, in which individual portions

of material are cut by the cutting machine, and then the bundles are bound manually or by means of a machine.

Figure: 1

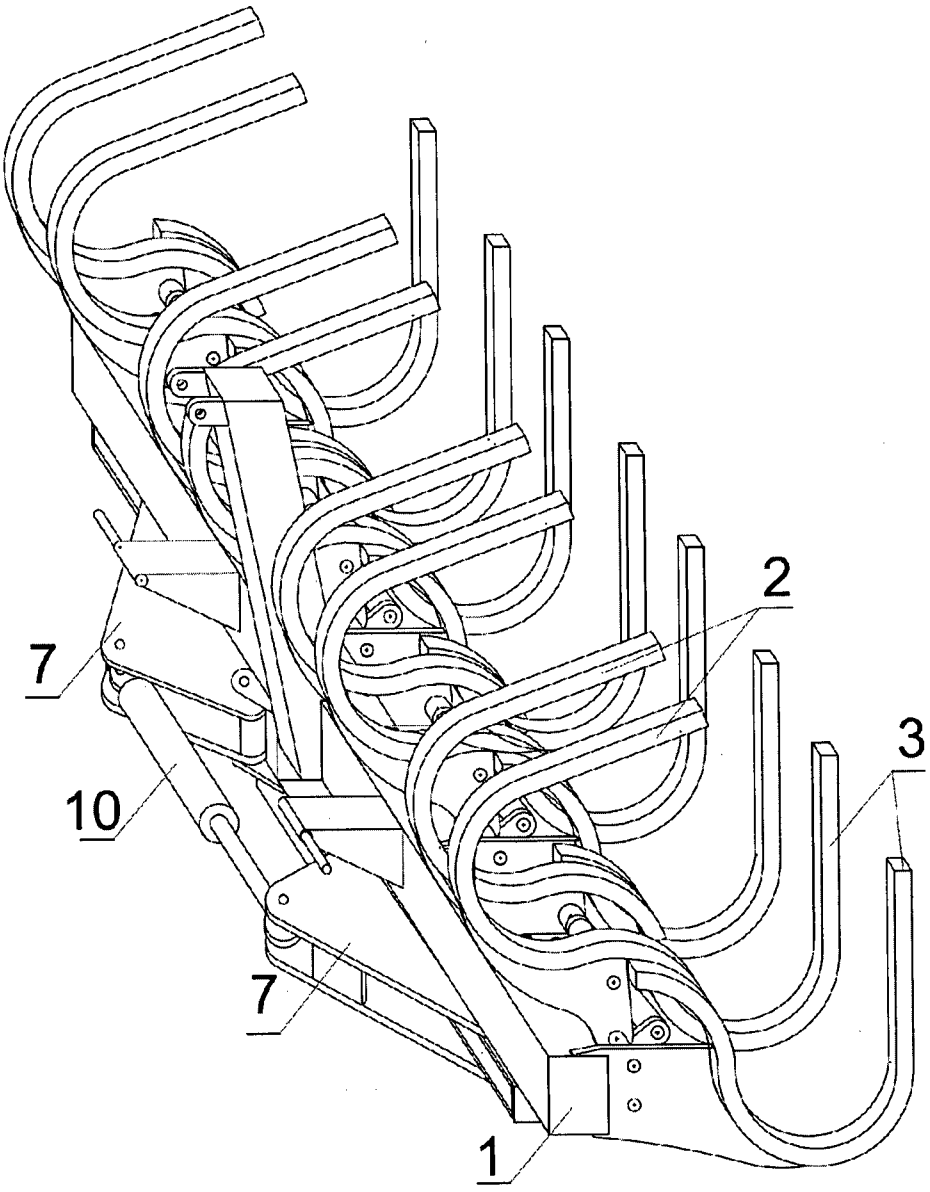


Figure: 2

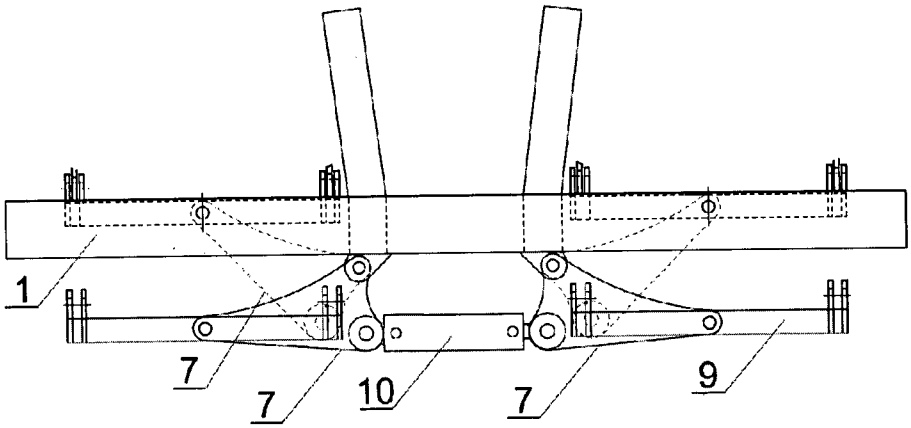
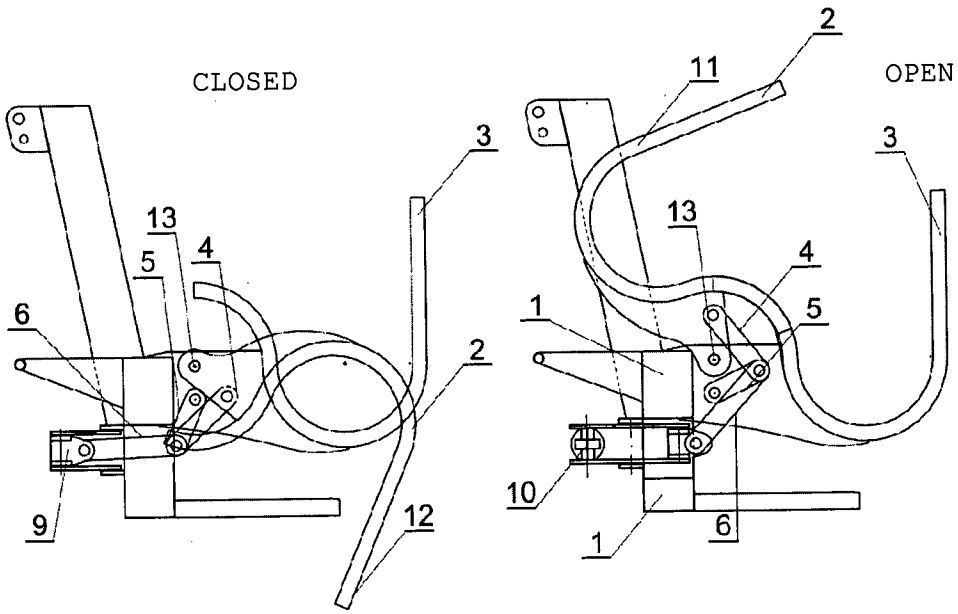


Figure: 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/SI2011/000052

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01G23/00
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)
A01D B65B 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 practical, 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 Y	GB 525 082 A (EDMUND HENRY HARBERD) 21 August 1940 (1940-08-21) column 1, lines 27-34; figure 1	1,2,4-6, 8,9 3,7
Y	FR 2 582 574 A1 (RENAUD ALAIN [FR]) 5 December 1986 (1986-12-05) figure 9	3
Y	US 2007/113925 A1 (DISABATINO BENJAMIN [CA]) 24 May 2007 (2007-05-24) figure 1a	7
A	EP 1 852 013 A1 (LASCO HEUTECHNIK GMBH [AT]) 7 November 2007 (2007-11-07) the whole document	1,9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 March 2012	19/03/2012

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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