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(72) Inventor: **Bettini, Cristian**
42020 Bibbiano (RE) (IT)

(74) Representative: **Gotra, Stefano**
BUGNION S.p.A.,
No 22, via Paolo Borsellino
42100 Reggio Emilia (IT)

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(71) Applicant: **WOODLINE SRL**
42025 Cavriago (RE) (IT)

(54) **A log-splitter with a tilting work plane**

(57) A cylinder (2) overlies a mobile frame (5) having a preferably longitudinal development, the cylinder (2) having a parallel development thereto and being stably constrained thereto thanks to a presence of means for fastening (7). The cylinder (2), which ends in a wedge (3) able to split a piece of wood (6), is in hydraulic communication with a plurality of conduits (4) which are supplied by a motor (10), the conduits enabling circulation

of oil internally of the cylinder (2) under control of a control system (9). The log-splitter (1) exhibits a fixed frame (8) in connection with the mobile frame (5) through means for support (11) which enable, by means of manual displacement, a rotation of the mobile frame (5) with respect to the fixed frame (8) into predetermined and blockable angular positions.

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Description

[0001] The device of the invention is destined primarily for domestic use, where log-splitting is done for the purpose of heating rooms, for example for use in fireplaces or stoves or for cooking such as for example in barbecues or wood-fired ovens.

[0002] The log-splitter is a machine which is constituted by a cylinder operated through a lever or button group, which cylinder terminates at one end thereof in a wedge-shape, for breaking and splitting large pieces of wood.

[0003] The cylinder, which is moved by means of a hydraulic circuit, is stably located on a work plane which doubles as a bench for the log and as support structure for the whole structure.

[0004] Log-splitters already present on the market are sub-divided into two main classifications, namely on whether the work plane is horizontal or vertical.

[0005] There is also a distinction between the kind of destination of the device, i.e. whether it is intended for domestic or for semi-professional use, or indeed for professional use; this influences the size of the motors fitted and therefore the size of logs the devices can split.

[0006] The prior art has more recently progressed to include log-splitters which are integrated with means for transport thereof.

[0007] Where an operator avails of a fixed log-splitter, after lopping a tree or radically pruning it, he has to collect up the wood pieces and place them all in the vicinity of the log-splitter.

[0008] If the operator is using a mobile log-splitter, however, he can move it into the area where the pruning and lopping operations have just taken place, thus obviating the laborious wood-shifting operations.

[0009] The prior art comprises, for example, US patent US4153088, which describes a log-splitter having a horizontal work plane provided, opposite the cutting zone, with a hole for gripping and drawing the wood.

[0010] This machine eases the operator's work, allowing him to split the wood in the place where the wood was lopped, but also has the disadvantage of subjecting the operator to considerable exertions in lifting up the wood from the ground and positioning it on the work plane.

[0011] Each time the operator wishes to cutting a piece of wood, he is required to gather up the wood first, raise it up to the cutting zone and rest it on the work plane.

[0012] In order to solve the above problem, wood-splitting machines have been devised which have an inclinable work plane, going from the horizontal to the vertical positions and being totally integrated with vehicles for moving the machines.

[0013] These systems operate with the log-splitter in a horizontal position in order to reduce the overall size thereof, and for easing transport thereof, and once the operative zone has been reached they rotate the log-

splitter up until it is in a vertical position, in order to minimise the exertions the operator has to endure in translating the wood from the ground to the work plane.

[0014] For example, US3779295 describes a truck equipped with a log-splitter, the latter being able to rotate from the horizontal position into the vertical position.

[0015] This device enables the possibility of positioning the log-splitter in a horizontal position during transport and in a vertical position during cutting operations.

[0016] US patent US5651404 achieves similar aims, and comprises a trailer of a small truck which is provided with two log-splitting machines, each tiltable from the horizontal position to the vertical position.

[0017] US patent US4503894 exhibits an agricultural truck peripherally mounting, close to a wheel thereof, a log-splitter connected to the structure by means of a four-bar hinge which, in combination with a pneumatic cylinder, enables rotation from a horizontal position into a vertical position.

[0018] For movement of the log-splitter, the above-described devices include a second pneumatic cylinder and a second motor for powering the second cylinder, for moving the work plane.

[0019] These devices exhibit some disadvantages in consideration of the fact that the object of the present invention is destined for a domestic and non-professional use.

[0020] For example, the presence of a second motor and a second cylinder for moving the work plane, give the machine a first disadvantage of being very heavy, making it difficult for an operator to transport the system manually; it is probably for this reason that the above machines are associated to means for locomotion.

[0021] The presence of a second motor and cylinder lead to a disadvantageous complexity in the realisation of the machine, a reduction in its operative reliability and an increase in manufacturing costs therefor, because of the presence of the two motors and the two cylinders and a consequent increase in maintenance interventions in order to guarantee a good working life for the machine.

[0022] A further disadvantage of the cited prior art patent is that the operator is not able to rotate the work plane.

[0023] Consequently the connection position between the fixed frame and the mobile frame of the log-splitter is limited by constructional needs, and there is no connection in a centre-of-gravity position, which would enable an operator to rotate the plane manually.

[0024] The above-cited solutions involve the association of the log-splitter to a means of locomotion of considerable size, which precludes any possibility of moving the log-splitter into a domestic closed environment, for example up to a side of a fireplace where it could be used to split wood which would then be used directly to build up the domestic fire.

[0025] The main aim of the present invention is to provide a log-splitter having a tiltable work plane which log-

splitter is light and easy to transport.

[0026] An additional aim of the invention is to provide a log-splitter having a tiltable work plane constituted by a smaller number of components, with the aim of providing a simple machine which is easy to manage and maintain.

[0027] A further aim of the invention is to provide a log-splitter having a tiltable work plane of small dimensions, which is thus easy to transport even into a home situation.

[0028] Another advantage of the present invention is to provide a log-splitter having a tiltable work plane which is provided with a connection between the fixed frame and the mobile frame which enables the operator to rotate the work plane autonomously.

[0029] The set technical aims are attained by a log-splitter having a tiltable work plane which is characterised in that it comprises one or more of the technical solutions claimed herein below.

[0030] A preferred but non-exclusive embodiment of the invention will now be described, illustrated by way of non-limiting example in the figures of the drawings, in which:

figure 1 is an exploded front view of a log-splitter with a tiltable work plane according to the invention, positioned in a horizontal work position;

figure 2 is a front view of a log-splitter having a tiltable work plane according to the invention, positioned in a first oblique work position;

figure 3 is a front view of a log-splitter with a tiltable work plane according to the invention, positioned in a second oblique work position;

figure 4 is a front view of a log-splitter with a tiltable work plane according to the invention in a vertical work position;

figure 5 is a front view of log-splitter with a tiltable work plane during a first operational stage;

figure 6 is a front view of log-splitter with a tiltable work plane during a second operational stage.

[0031] With reference to the figures of the drawings, 1 denotes in its entirety a log-splitter having a tiltable work plane, according to the invention.

[0032] The log-splitter 1 exhibits a mobile frame 5 having a preferably longitudinal development, terminating in a bottom plate 29 which functions as a striker for a block of wood 6 during cutting operations, on which a circular cavity 18 is afforded, having an axis which is parallel to the direction of development of the mobile frame 5.

[0033] A pneumatic cylinder 2 is stably positioned above the mobile frame 5 by known-type means for fastening 7, the cylinder being oriented parallel to the development of the mobile frame 5 and controlled by means of a control system 9 which is of known type and constituted by a pair of levers 31.

[0034] The cylinder 2 is constituted by a stem 25

which is alternately translatable internally of a jacket 26 and which on an end thereof 25a exhibits a wedge 3, the wedge 3 being able to break a piece of wood 6 thanks to a force thereon transmitted by the cylinder 2.

[0035] More precisely, the stem 25 translates from a start position in which the end 25a is close to an end 26a of the jacket 26 and the wedge 3 is facing the block of wood 6 to be cut, to an end position in which the end 25a is close to the bottom plate 29 of the mobile frame 5 and the wedge 3 has split the block of wood 6.

[0036] The log-splitter 1 also includes a fixed frame 8 exhibiting a first tract 8a in contact with the earth and a second tract 8b which is hinged to the mobile frame 5.

[0037] The fixed frame 8 exhibits, in proximity of the first tract 8a, on a first side 8c, a base 21, which base 21 lends improved stability to the log-splitter 1, while on an opposite side 8c there is a frame 22 which terminates in a pair of wheels 23 which aid the displacements of the log-splitter 1.

[0038] On the opposite side 8d a motor 10 is mounted for supplying and circulating the oil through a plurality of conduits 4 internally of the cylinder 2.

[0039] Means for support 11 are present on the second end 8b, opposite the first end 8a, for generating a rotational connection of the mobile frame 5 with the fixed frame 8, in predetermined and blockable angles through a 90° arc. The means for support 11 include a first bracket 12a and a second bracket 12b which are parallel to one another and which define a space internally of which the mobile frame 5 rotates.

[0040] The first bracket 12a exhibits a first hole 13a and a plurality of holes, preferably constituted by a second hole 14a, a third hole 14b and a fourth hole 14c, which second, third and fourth holes are distributed in such a way as to lie on an arc of circumference having the first hole 13a at a centre thereof.

[0041] Similarly the second bracket 12b exhibits a further first hole 13b, a centre of which identifies, together with the centre of the first hole 13a, an axis which is perpendicular with respect to the longitudinal development of the mobile frame 5, and a second plurality of holes 24, preferably constituted by a further second hole 24a, a further third hole 24b and a further fourth hole 24c, each of which has a centre that together with the centre of the respective hole belonging to the first plurality 14, which it faces, creates a perpendicular axis to the longitudinal development of the mobile frame 5.

[0042] More precisely, the first hole 13a, the further first hole 13b, the second hole 14a and the further second hole 24a, which define a horizontal work position of the mobile frame 5, are arranged in such a way as that the centres of the holes lie on a horizontal plane.

[0043] The first hole 13a, the further first hole 13b, the third hole 14b and the further third hole 24b, which define a first oblique work position of the mobile frame 5, are arranged in such a way that the centres thereof lie on an inclined plane, preferably inclined by 23° with respect to the horizontal.

[0044] The first hole 13a, the further first hole 13b, the fourth hole 14c and the further fourth hole 24c, which define a second oblique work position of the mobile frame 5, are arranged in such a way that the centres thereof lie on an inclined plane, preferably inclined by 45° with respect to the horizontal.

[0045] In a position underlying the mobile frame 5 there are a first slot 15 and a second slot 16, which are parallel to one another and oriented perpendicular to the longitudinal development of the mobile frame 5.

[0046] The first slot 15 is permanently connected, by means of a pivot 30, to the first hole 13a and the further first hole 13b, defining a hinge-type connection, while the second slot 16 is alternatively connected to the second hole 14a and the further second hole 24a, or the third hole 14b and the further third hole 24b, or the fourth hole 14c and the further fourth hole 24c, by means of a mobile key 19.

[0047] A fourth slot 17 is present in the base 21 of the of the fixed frame 8, and has an axis which is parallel to the development direction of the fixed frame 8, and is able to place the mobile frame 5 in a vertical work position when coupled by the mobile key 19 to the circular cavity 18 in the bottom plate 29.

[0048] The mobile frame 5 laterally exhibits a pair of wings 20 for containing lateral displacements of a block of wood lying on the mobile frame 5.

[0049] The log-splitter functions as follows:

[0050] With the log-splitter positioned horizontally, i. e. with the mobile plug 19 coupled in the second slot 16, the second hole 14a and the further second hole 24a, the operator takes a piece of wood 6 from a stacker 28 and rests it on the mobile frame 5, with the bottom plate 29 as striker.

[0051] Thanks to the presence of the wings 20, the operator can break the piece of wood 6 without having manually to hold it on the work plane.

[0052] At this point, by acting with both hands on the pair of levers 31, the operator translates the stem 25 and consequently the wedge 3 from the start position to the stop position, thus performing the splitting operation.

[0053] The level of wood in the stacker 28 lowers.

[0054] In order to reduce the effort of lifting the wood pieces up to the mobile frame 5, the operator inclines the mobile frame 5 into a first oblique position.

[0055] In order to rotate the mobile frame 5 with respect to the fixed frame 8, the operator first removes the mobile key 19 from the second hole 14a and the further second hole 24a using one hand, and with the other rotates the mobile frame 5, bringing the second slot 16 into an axial position with the third hole 14b and the further third hole 24b; he then replaces the mobile key 19, positioning the mobile frame 5 at an inclination of about 23° with respect to the horizontal.

[0056] As the stacker 28 of pieces of wood 6 lowers, the operator can lower the mobile frame 5 into a second oblique position, defined when the mobile key 19 is coupled in the second slot 16 with the fourth hole 14c and

the further fourth hole 24c, up to when the work plane reaches the vertical position, which is when the mobile key 19 is coupled in the third slot 16 and the circular cavity 18.

[0057] From the above description, it can be seen that as a further advantage the log-splitter offers the option of positioning the mobile frame 5 at a height, with respect to the ground, which reduces to a minimum the lifting exertions of the piece of wood 6 on the part of the operator.

[0058] The presence of the pair of wings 20 gives the log-splitter a double advantage.

[0059] Firstly it removes the need for the operator to keep a hand on the log, and it also protects the operator from any splinters or fragments of wood which might fly free when the log is split.

Claims

1. A log-splitter (1) having a tilting work plane, comprising:

a mobile frame (5), having a longitudinal development and having at an end thereof a bottom plate (29), which is able to house a piece of wood (6);

a pneumatic cylinder (2), positioned parallel to a direction of longitudinal development of the mobile frame (5) and connected in an overlying position thereto, having a wedge (3) at an end thereof for splitting the piece of wood (6), and being in communication with a plurality of conduits (4);

means for fastening (7) for connecting the pneumatic cylinder (2) with the mobile frame (5);

a fixed frame (8) having a first tract (8a) which is in contact with the ground and a second tract (8b) which is hinged to the mobile frame (5);

a control system (9) for commanding the pneumatic cylinder (2) which is superiorly located on the mobile frame (5);

a motor (10) which is solidly constrained to the fixed frame (5) and in hydraulic communication with the plurality of conduits (4) for supplying oil internally of the pneumatic cylinder (2);

characterised in that it comprises means for support (11) in rotation of the mobile frame (5) with respect to the fixed frame (8) which means for support (11) join the mobile frame (5) and the pneumatic cylinder (2) to the fixed frame (8) at a centre of gravity of a group constituted by the mobile frame (5) and the pneumatic cylinder (2), and **in that** the means for support (11) afford a plurality of different work positions for the mobile frame (5) of the log-splitter.

2. The log-splitter (1) of claim 1, **characterised in that** the means for support (11) comprise:

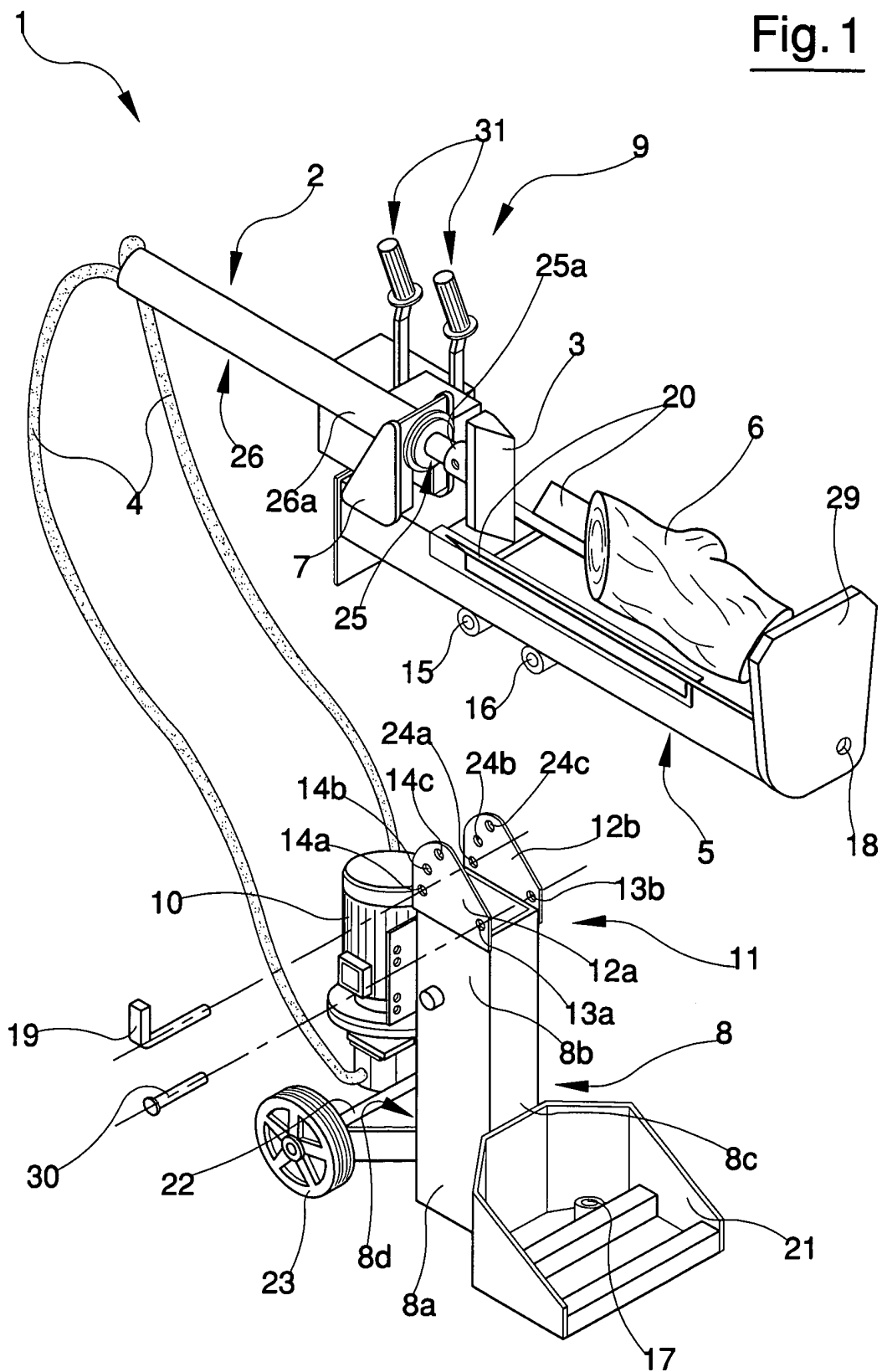
a first bracket (12a) connected to the fixed frame (8), in proximity of the second tract (8a), having a first hole (13a) and a first plurality of holes (14); a second bracket (12b) connected to the fixed frame (8) in proximity of the second tract (8a) and parallel to the first bracket (12a), having a further first hole (13b) and a second plurality of holes (24) which are arranged specularly with respect to the first hole (13a) and the first plurality of holes (14) of the first bracket (12a);
 a first slot (15) which is inferiorly connected to the mobile frame (5) and oriented perpendicular to the direction of development of the mobile frame (5), and which is coaxial to the first hole (13a) and to the further first hole (13b);
 a second slot (16) which is inferiorly connected to the mobile frame (5) parallel to the first slot (15) and which is coaxial alternatively to a hole belonging to the first plurality of holes (14) and a further hole belonging to the second plurality of holes (24);
 a third slot (17) connected in proximity of the first tract (8a) of the fixed frame (8);
 a circular cavity (18) afforded on the bottom plate (29) of the mobile frame (5);
 a connection pivot (30) stably fixed between the first hole (13a), the further first hole (13b) and the first slot (16);
 a mobile key (19) for defining a plurality of work positions of the mobile frame (5) when engaged in the second slot (16) and a hole belonging to the first plurality of holes (14) and a further hole belonging to the second plurality of holes (24).

3. The log-splitter (1) of claim 2, **characterised in that** the first plurality of holes (14) exhibits a second hole (14a), a third hole (14b) and a fourth hole (14c), and the second plurality of holes (24) exhibits a further second hole (24a), a further third hole (24b) and a further fourth hole (24c) which respectively define a horizontal first work position of the mobile frame (5) when the mobile key (19) is coupled in the second slot (16) and the second hole (14a) and the further second hole (24a), an oblique second work position of the mobile frame (5), when the mobile key (19) is coupled in the second slot (16) and the third hole (14b) and the further third hole (24b), and an oblique third work position of the mobile frame (5) when the mobile key (19) is coupled in the second slot (16) and the fourth hole (14c) and the further fourth hole (24x).
4. The log-splitter (1) of claim 2, **characterised in that** the mobile key (19) defines a vertical fourth work

position of the mobile frame (5) when coupled with the third slot (17) and the circular cavity (18).

5. The log-splitter (1) of claim 1, **characterised in that** the mobile frame (5) laterally exhibits a pair of wings (20) for laterally containing a piece of wood (6).
6. The log-splitter (1) of claim 1, **characterised in that** the fixed frame (8) exhibits a transversal development with respect to a direction of development of the mobile frame (5).
7. The log-splitter (1) of claim 1, **characterised in that** the fixed frame (8) exhibits, in proximity of the first tract (8a), a frame (22) at ends of which a pair of wheels (23) are fixed for movement of the log-splitter (1).
8. The log-splitter (1) of claim 1, **characterised in that** the control system (9) of the pneumatic cylinder (2) exhibits a pair of levers (31).

Fig. 1



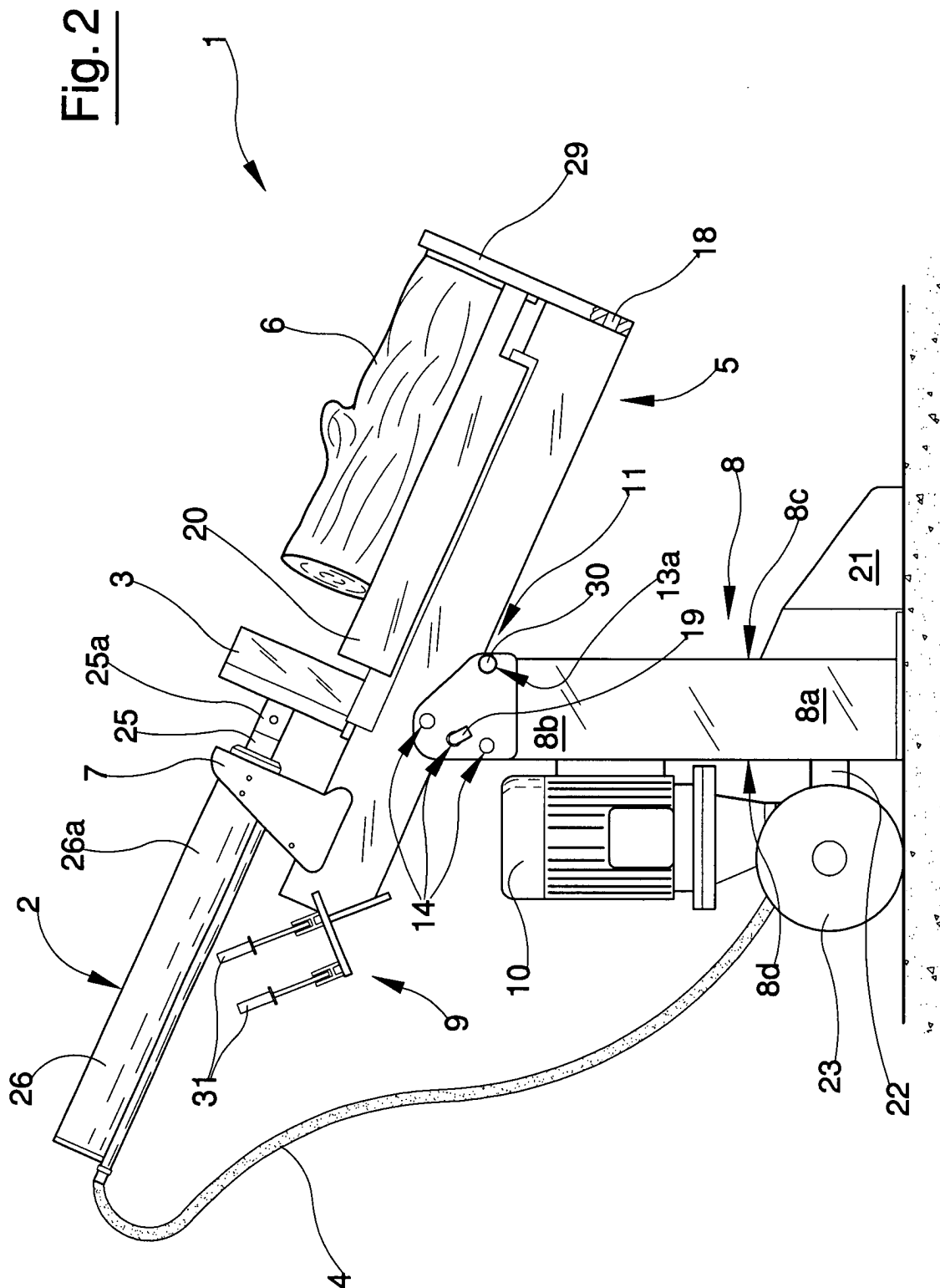


Fig. 3

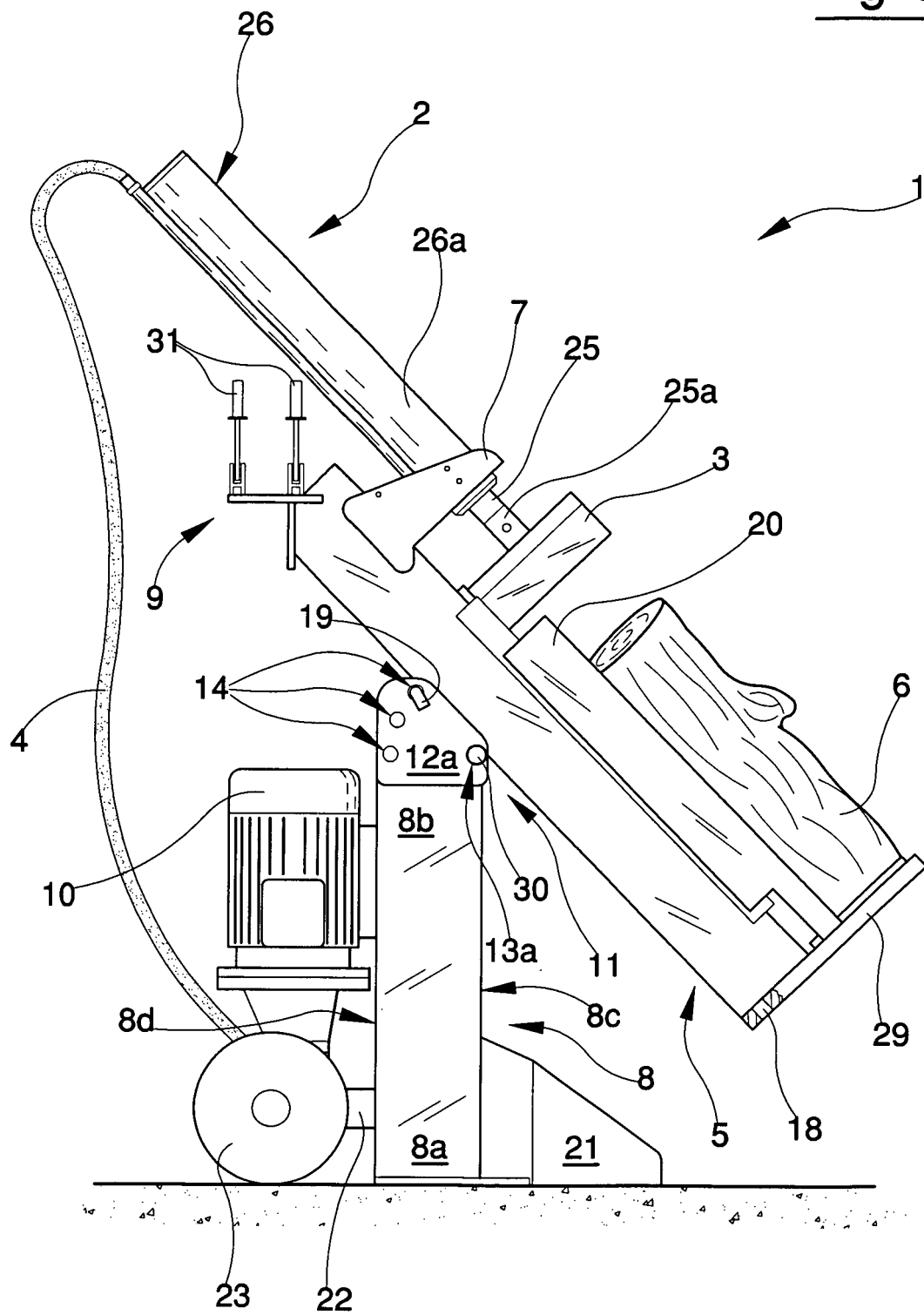
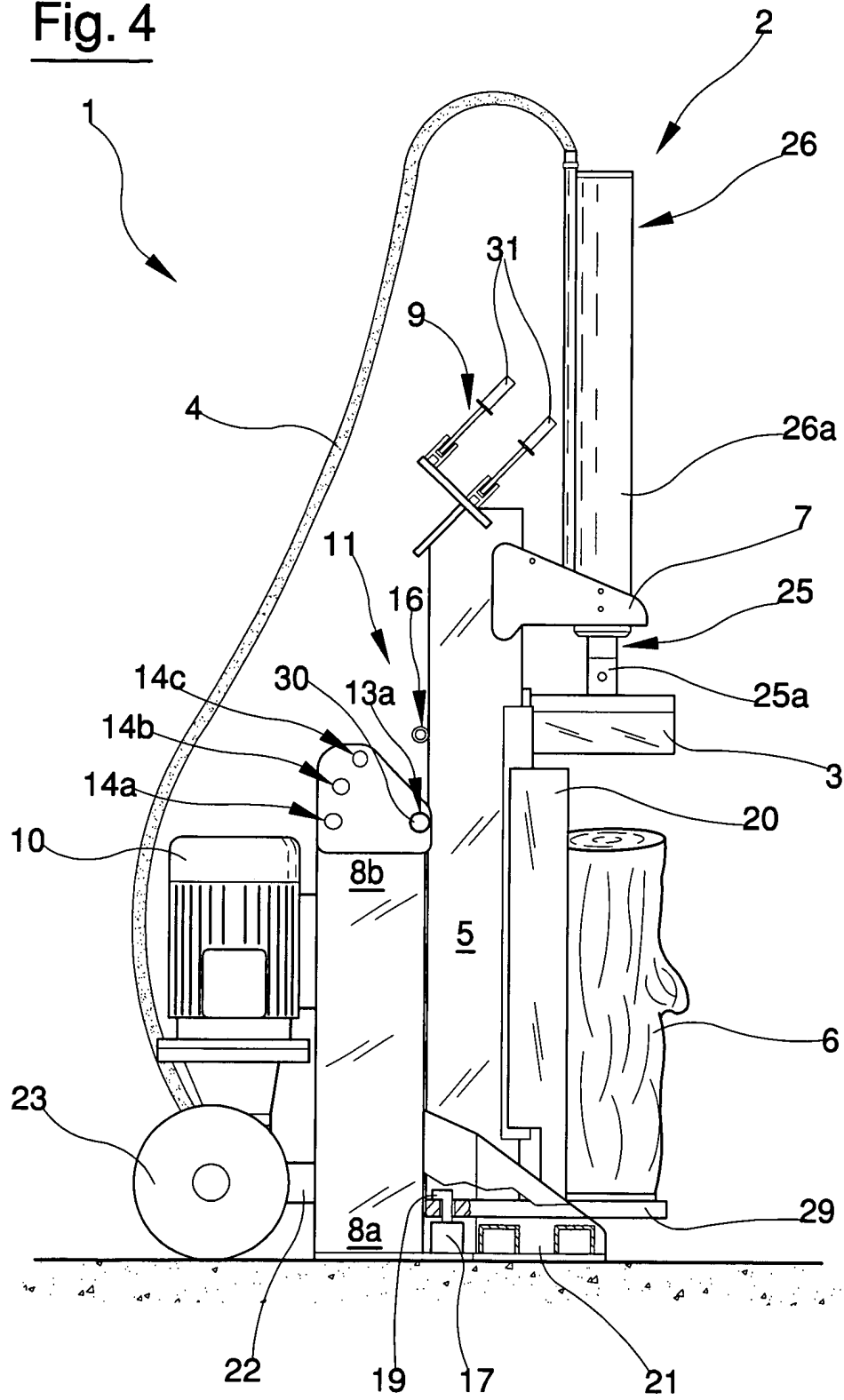


Fig. 4



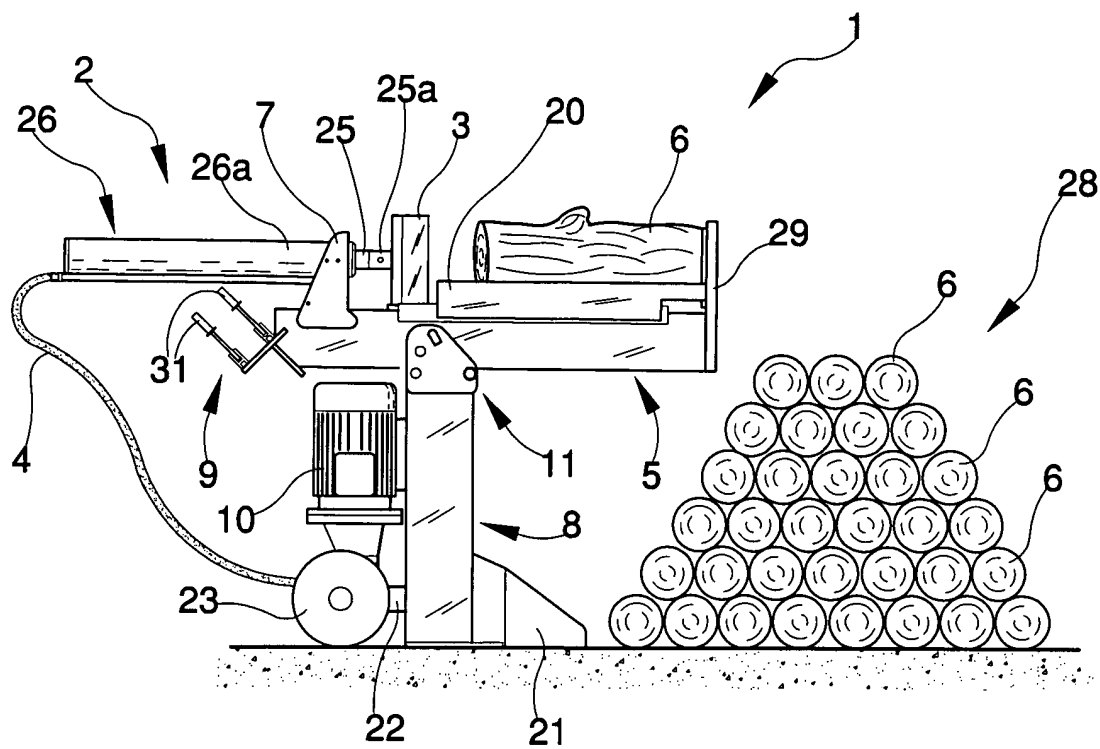


Fig. 5

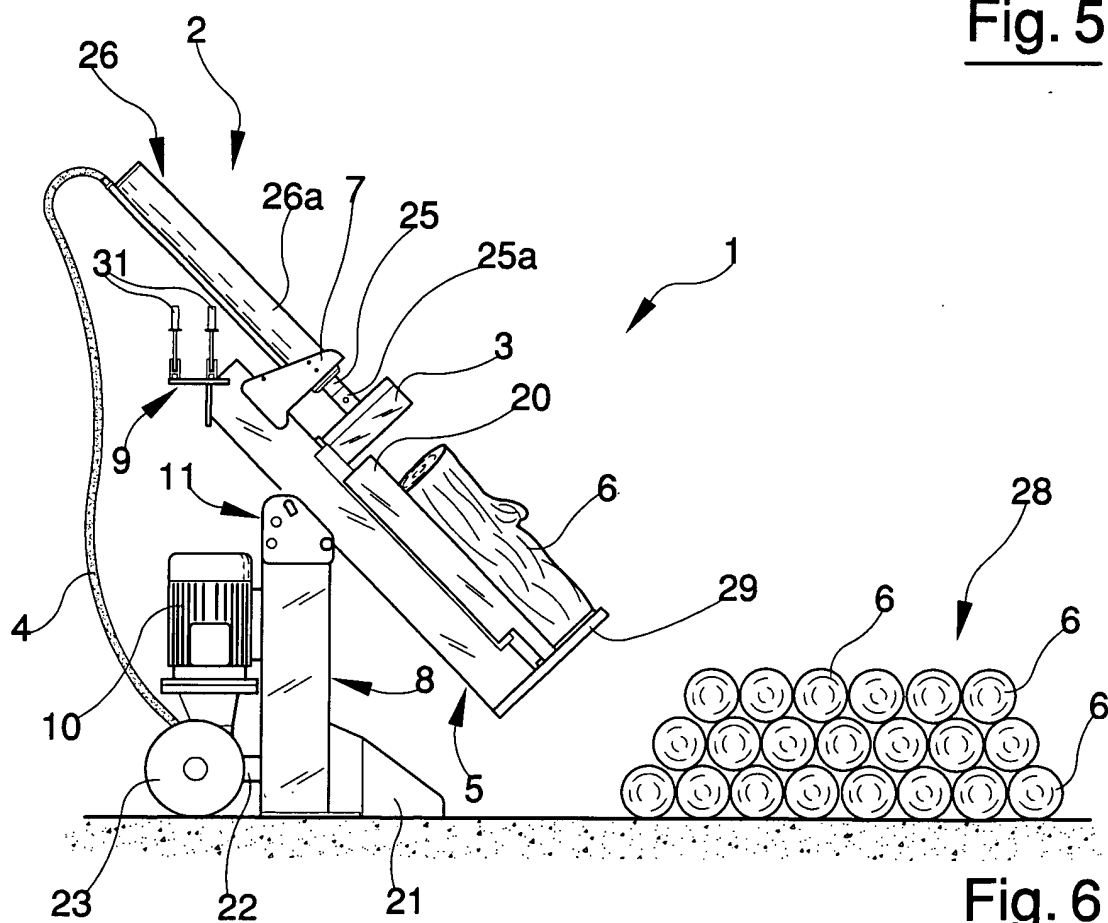


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 05 00 3851

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 August 2005	Examiner Meritano, L
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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