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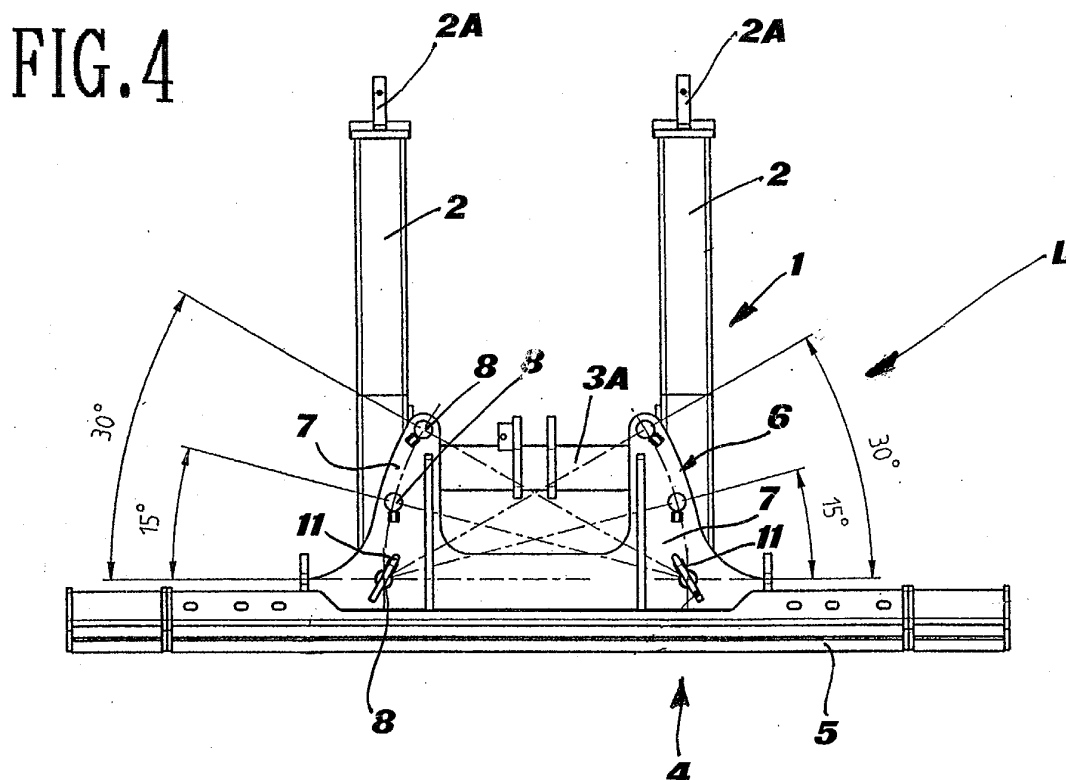
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(54) **Revolving blade for small excavators**

(57) The invention concerns a revolving blade for compact excavators (or miniexcavators), of the type comprising a support frame (1) and a blade unit (4). According to the present invention, the support frame (1) consists of two side members (2) and at least one cross member (3), while the blade unit (4) with the actual blade (5) comprises a U-shaped support (6) on each of the arms (7) of which a plurality of holes (8) are formed, dis-

tributed along a circle arc, two similar holes (9) being formed at the outer ends of the side members (2) of said support frame (1). The blade unit (4) is apt to be connected to the support frame (1) in a plurality of differently oriented positions by inserting a couple of pins (10) in said two holes (9) of the side members (2) of the support frame (1) and in holes (8) of said U-shaped support (6) brought in alignment with the first ones.



Description

[0001] The present invention relates to excavators - self-moving machines with wheels, tracks or articulated supports, provided with an upper structure or turret, normally apt to rotate by 360° and supporting an excavating boom, and mainly designed to excavate with a shovel or a bucket, while remaining stationary - and concerns, more particularly, a revolving blade for compact or small excavators (excavators with an operative mass below 6,000 Kg).

[0002] It is known that, at present, almost all the small excavators are provided with a front stabilizing blade (known as "scraper") of the fixed type, with the blade profile perpendicular to the forward moving direction. The functions carried out by the scraper are essentially two: the first (and most important) is to provide for a stabilizing action for the small excavator during excavation or load lifting (so as to avoid the problems deriving from its reduced size and reduced weight), the second function is its use in refilling and resetting actions by operating a double-acting cylinder.

[0003] When performing refilling operations, the high limit of conventional scrapers in small excavators is to have a fixed profile; thus, when having to close an excavation, the operator is forced to perform various maneuvers with the bottom car of the machine to successfully complete the operation, or else - when the excavation sites are close to roads - he is forced to close the excavation with the bucket, unless wishing to occupy the entire lane with the machine.

[0004] The object of the present invention is to overcome or at least reduce such drawbacks in small excavators, while maintaining the characteristics of slenderness, maneuverability and simplicity typical of these machines, without making the construction more difficult and/or increasing the costs in a significant way.

[0005] This purpose is achieved by equipping small excavators with a revolving blade of simple structure and easy to maneuver, which forms the object of the present invention.

[0006] The revolving blade according to the present invention comprises a support frame and a blade unit, and is characterized in that the support frame consists of two side members and at least one cross member; in that the blade unit with the actual blade comprises a U-shaped support, on each of the arms of which a plurality of holes are formed, distributed along a circle arc, two similar holes being formed at the outer ends of the side members of the support frame; and in that the blade unit is apt to be connected to the support frame in a plurality of differently oriented positions, by inserting a couple of pins in said two holes of the frame side members and in holes of said U-shaped support, brought in alignment with the first ones.

[0007] Preferably, said holes in the side members of the support frame are formed in correspondence of said cross member.

[0008] To said blade there are advantageously associated two extensions, to be mounted in correspondence of the blade in a working position, and behind the actual blade in a rest position.

[0009] A preferred embodiment of the revolving blade for small excavators according to the present invention will now be described in further detail, by way of example, with reference to the accompanying drawings, in which:

[0010] Figs. 1 and 2 are a side view and a top view of a small excavator equipped with a conventional fixed blade or scraper;

[0011] Fig. 3 is a general perspective view of the revolving blade according to the present invention;

[0012] Figs. 4 and 5 are, respectively, a top view and a side view, on a larger scale, of the revolving blade shown in fig. 3;

[0013] Figs. 6 and 7 are two perspective views, a front view and respectively a rear view, with disassembled parts, of the revolving blade according to the invention shown in Figs. 3 to 5;

[0014] Figs. 8 and 9 are a side view and a top view of a small excavator equipped with the revolving blade of Figs. 3 to 7, oriented with an inclination towards the right side of the machine; and

[0015] Fig. 10 is a top view, similar to that of Fig. 8, of a small excavator equipped with the revolving blade of Figs. 3 to 7, in which the blade is shown not inclined and with the extensions mounted on the inside.

[0016] As can be seen from Figs. 1 and 2, the small excavators of prior art, provided with a turret T rotatably mounted on a bottom car S with tracks C, are equipped - as well as with an excavating boom BE ending with a bucket B, carried by the turret T - with a fixed blade or scraper R carried on the front of the bottom car S.

[0017] According to the invention, it is now provided to equip small excavators of the type shown in Figs. 1 and 2, with a revolving blade as shown in Figs. 3 to 7, to provide several advantages.

[0018] As shown in Figs. 3 to 7, the revolving blade L according to the invention comprises a support frame 1, with two side members 2 and at least one cross member 3, and a blade unit 4, with an actual blade 5 and a U-shaped support 6 for said blade.

[0019] The support frame 1 comprises, at the free ends of the side members 2, ears 2A for hingeing onto the bottom car S of the small excavator and usually includes a second cross member 3A for connection to a cylinder-piston unit of the small excavator, which controls the vertical movement of the frame itself and thus of the revolving blade L.

[0020] The four arms 7 of the U-shaped support 6 each have three holes 8, formed along circle arcs whose center (Fig. 4) corresponds to the outermost hole 8 closer to the blade 5 of the opposite boom 7, while two holes 9 (Figs. 5 and 6) are provided at the outer ends of the side members 2 of the frame 1, where they connect to the cross member 3. Stout pins 10, equipped with com-

portable gripping and operating handles 11, allow to connect the blade 5 to the frame 1 in different positions (see Fig. 4), after having aligned each hole 9 of the side members 2 with a pair - selected according to the orientation one wishes to give to the revolving blade L - of holes 8 of the arms 7 of the support 6, by inserting therein the pins 10. These pins 10 have the double function of fulcrum for the rotation to orient and block the support 6 in an angular position, or in a normal position.

[0021] The revolving blade L according to the invention is completed by providing two extensions 12, apt to be mounted on both sides of said blade (or both on the same side, one next to the other), to allow the track of the small excavator, when the blade L is mounted, to keep away from the trench (and thus in safe working conditions) during the reclosing step. The two extensions 12, when not used, can be housed within the side-play of the central blade, as shown in Figure 10.

[0022] The revolving blade L according to the present invention can be very easily oriented both towards the right and towards the left. To orient the blade towards the right (see Figs. 8 and 9) it is sufficient - starting from the normal, straight position of Fig. 4 - to remove the left pin 10, to rotate the blade in respect of the right pin 10 (left in its place) and to reset the left pin 10 in the wanted position. To orient the blade towards the left (not shown) one proceeds as above, but inverting the pins.

[0023] The particular configuration of the revolving blade according to the present invention and its operating principle (with only two pins having the double function of orienting fulcrum and of locking fulcrum) allow to maintain the same forward projection of the blade profile, without having to use a particularly large blade which would thus limit the excavating potential.

[0024] The stabilizing function of the revolving blade according to the present invention remains unvaried in respect of the function of a conventional fixed blade since, with the blade in a lowered position, the rotation of the front blade unit occurs around pins perpendicular to the ground, allowing the lower profile of the blade to remain parallel to the soil, by resting on its entire length and thus ensuring steadiness.

[0025] Besides, the revolving blade according to the present invention introduces, in respect of prior art, the considerable advantage of allowing small excavators to refill trenches, or to level soils and roadbeds, or to remove snow or debris from streets and squares, through the normal rectilinear translation of the excavator (i.e. without being forced to perform continuous back and forth maneuvers, as it happened up-to-date with these machines, making use of a conventional fixed blade).

[0026] It is understood that other embodiments of the revolving blade for small excavators, differing from that described heretofore by way of example, can be conceived without departing from the scope of the present invention.

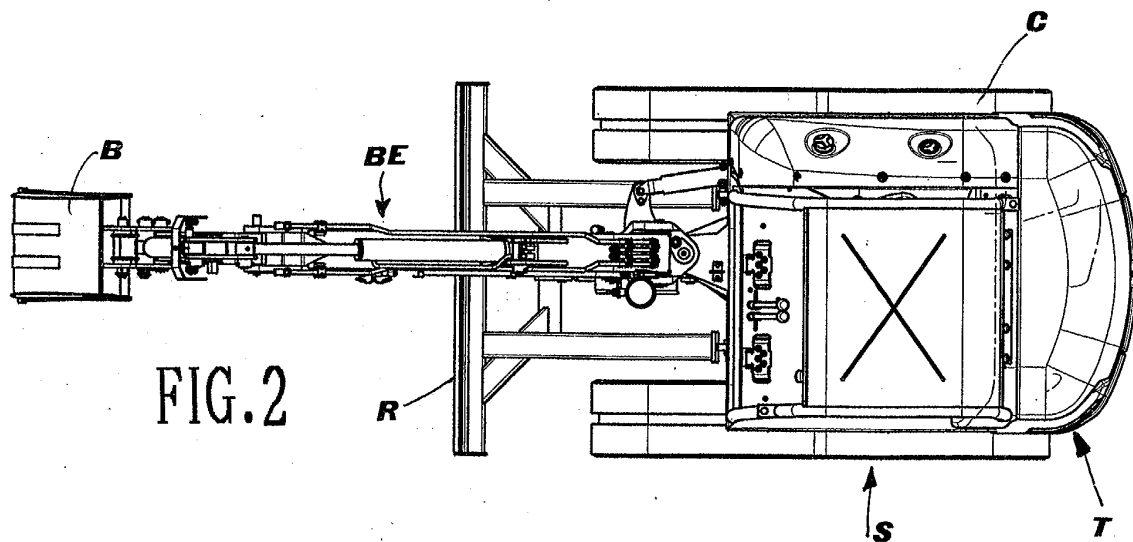
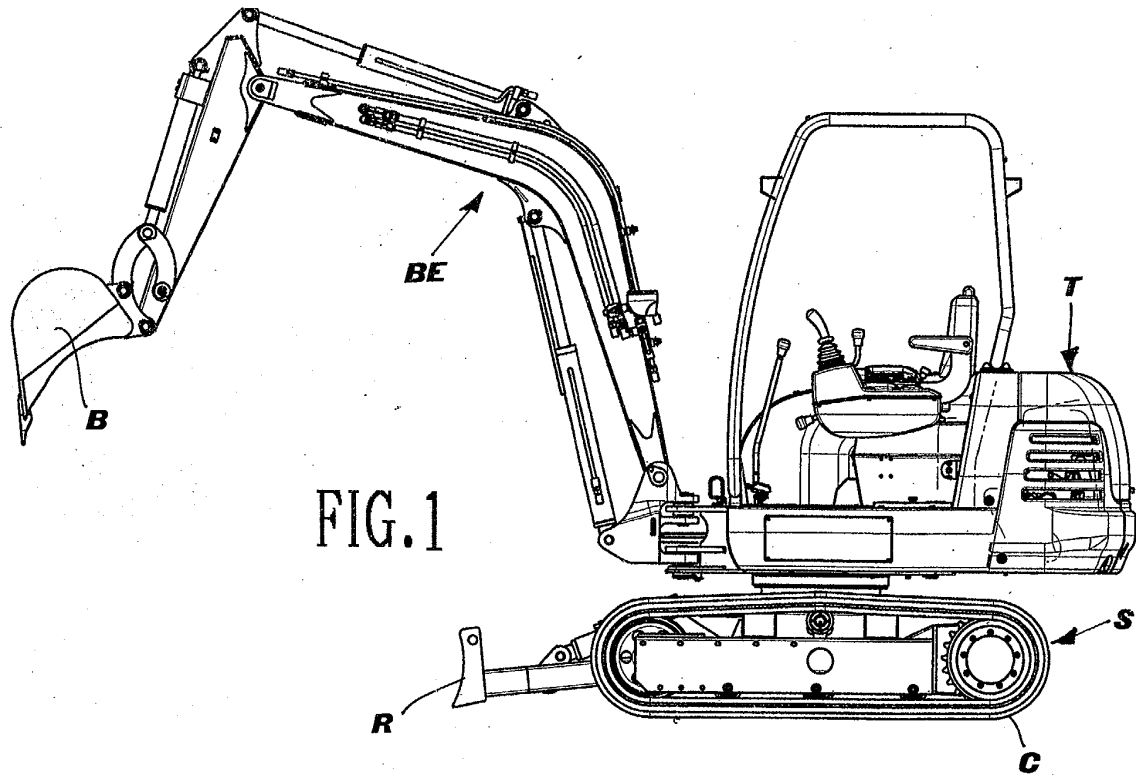
[0027] The invention also comprises small excavators equipped with a revolving blade as described and illus-

trated hereabove.

[0028] It is finally evident that the revolving blade according to the present invention, although it was conceived to equip small excavators and is actually apt to provide its best performances in association therewith - as just seen - can always be associated, with similar advantages even if less considerable, also to excavators which are heavier and larger than the compact ones.

Claims

1. Revolving blade for compact excavators (or miniexcavators), of the type comprising a support frame (1) and a blade unit (4), **characterized in that** the support frame (1) consists of two side members (2) and at least one cross member (3); **in that** the blade unit (4) with the actual blade (5) comprises a U-shaped support (6), on each of the arms (7) of which a plurality of holes (8) are formed, distributed along a circle arc, two similar holes (9) being formed at the outer ends of the side members (2) of the support frame (1); and **in that** the blade unit (4) is apt to be connected to the support frame (1) in a plurality of differently oriented positions by inserting a couple of pins (10) in said two holes (9) of the side members (2) of the frame (1) and in holes (8) of said U-shaped support (6) brought in alignment with the first ones.
2. Revolving blade as in Claim 1), wherein said holes (9) in the side members (2) of the support frame (1) are formed in correspondence of said cross member (3);
3. Revolving blade as in Claims 1) and 2), wherein said plurality of holes (8) formed on the arms (7) of the support frame (1) comprises three holes;
4. Revolving blade as in Claims 1) to 3), wherein two extensions (12) are associated thereto;
5. Revolving blade as in Claim 4), wherein said extensions (12) can be associated to one and/or the other end of the blade (5) in a working position, and behind the actual blade (5) in a rest position.



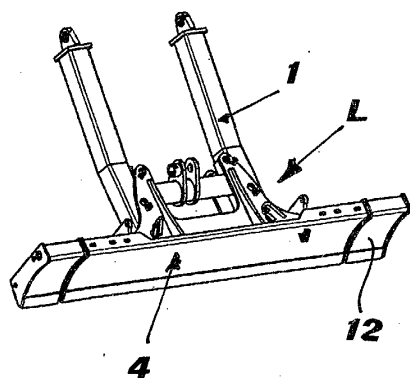


FIG. 3

FIG. 4

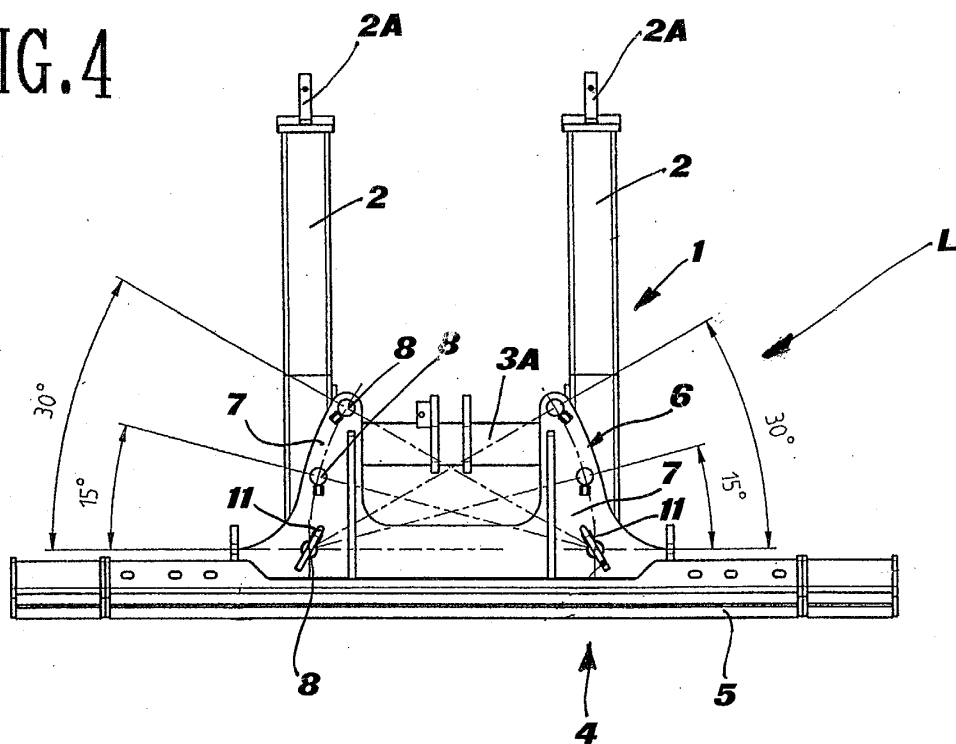
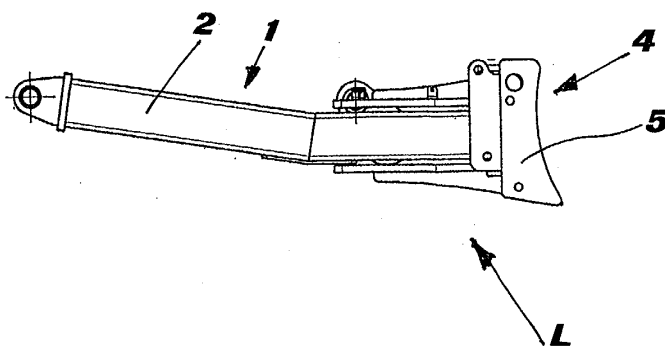
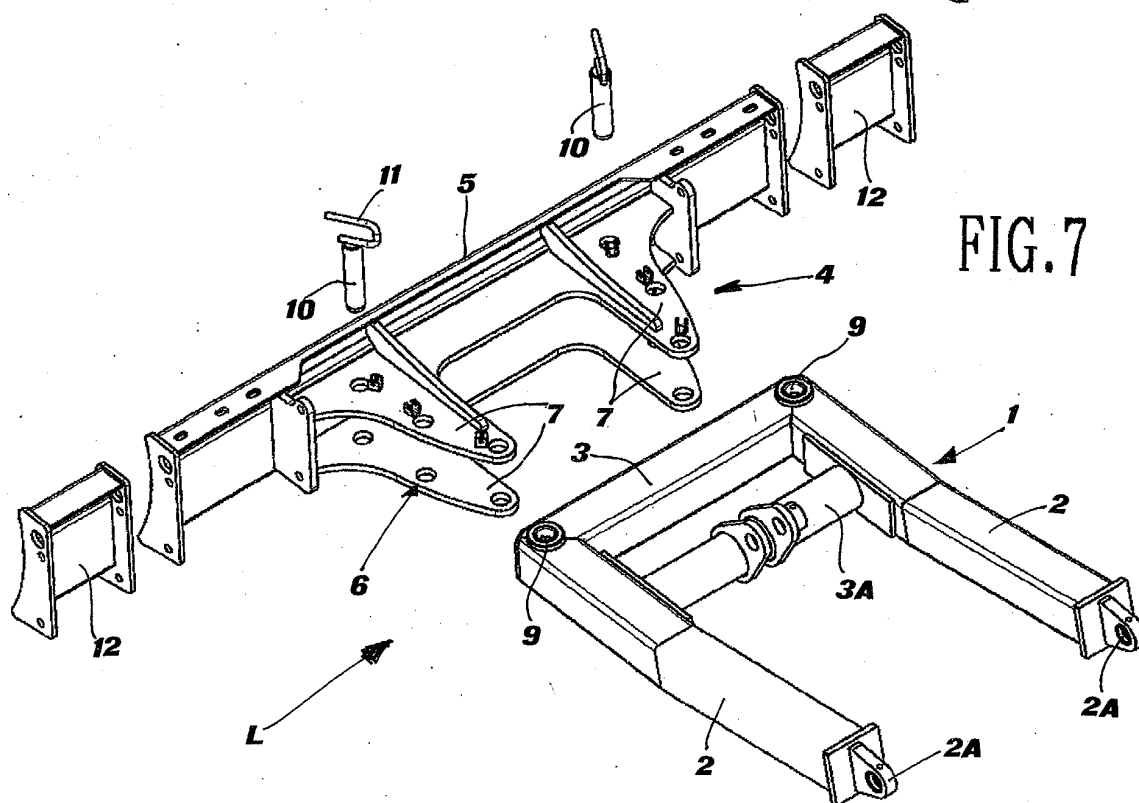
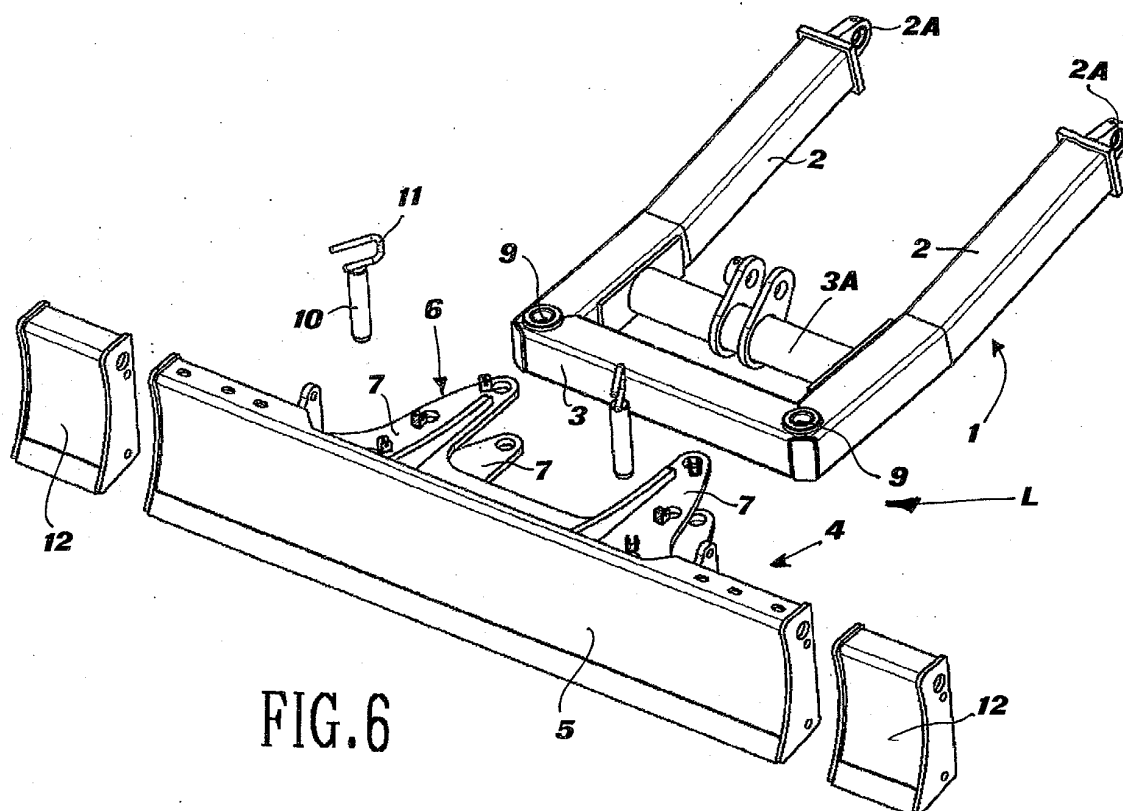
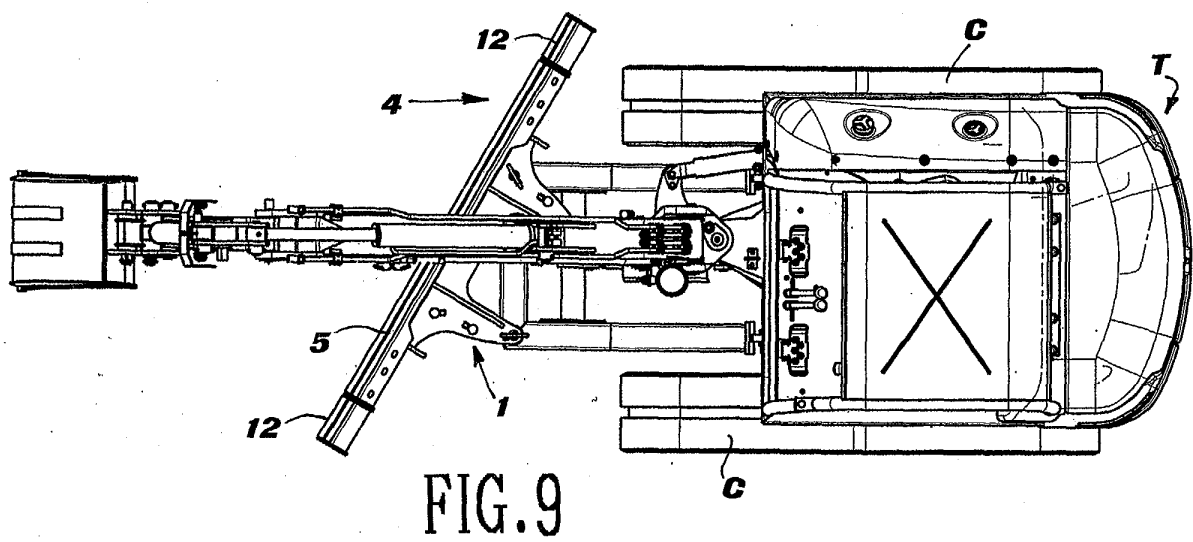
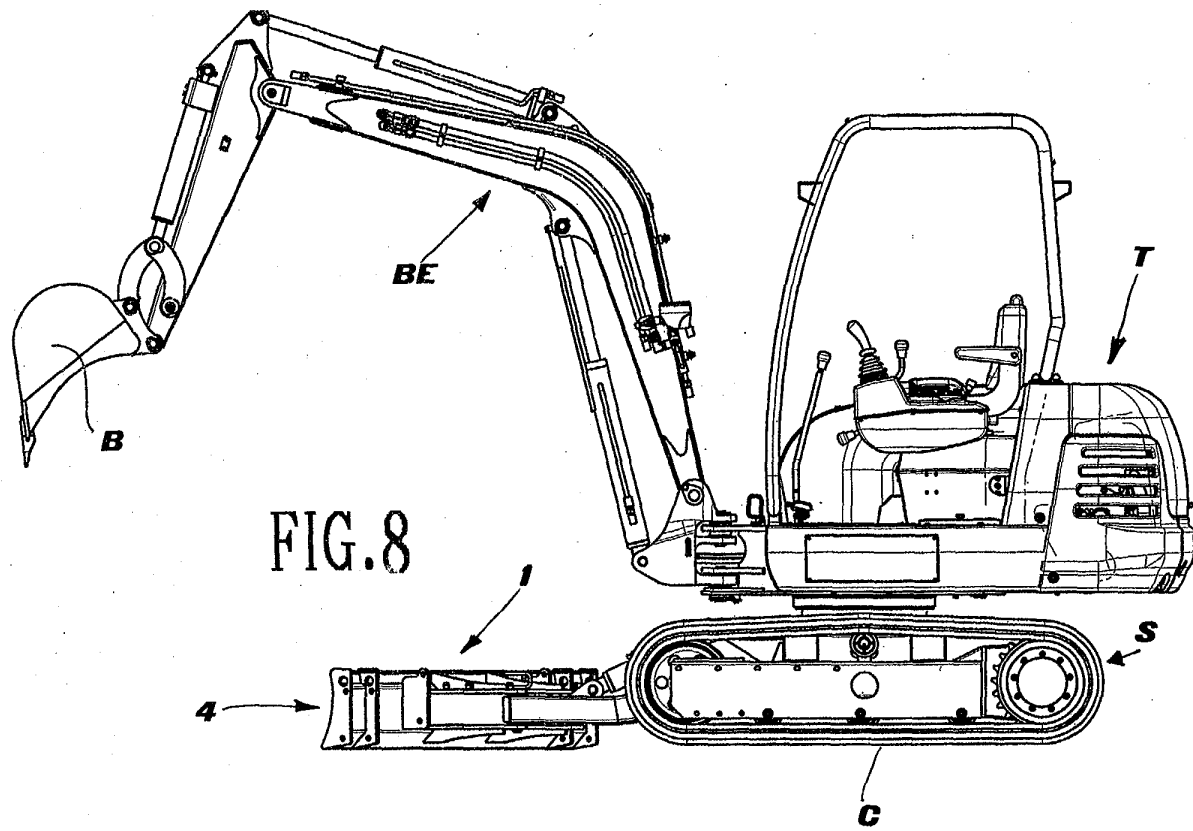


FIG. 5







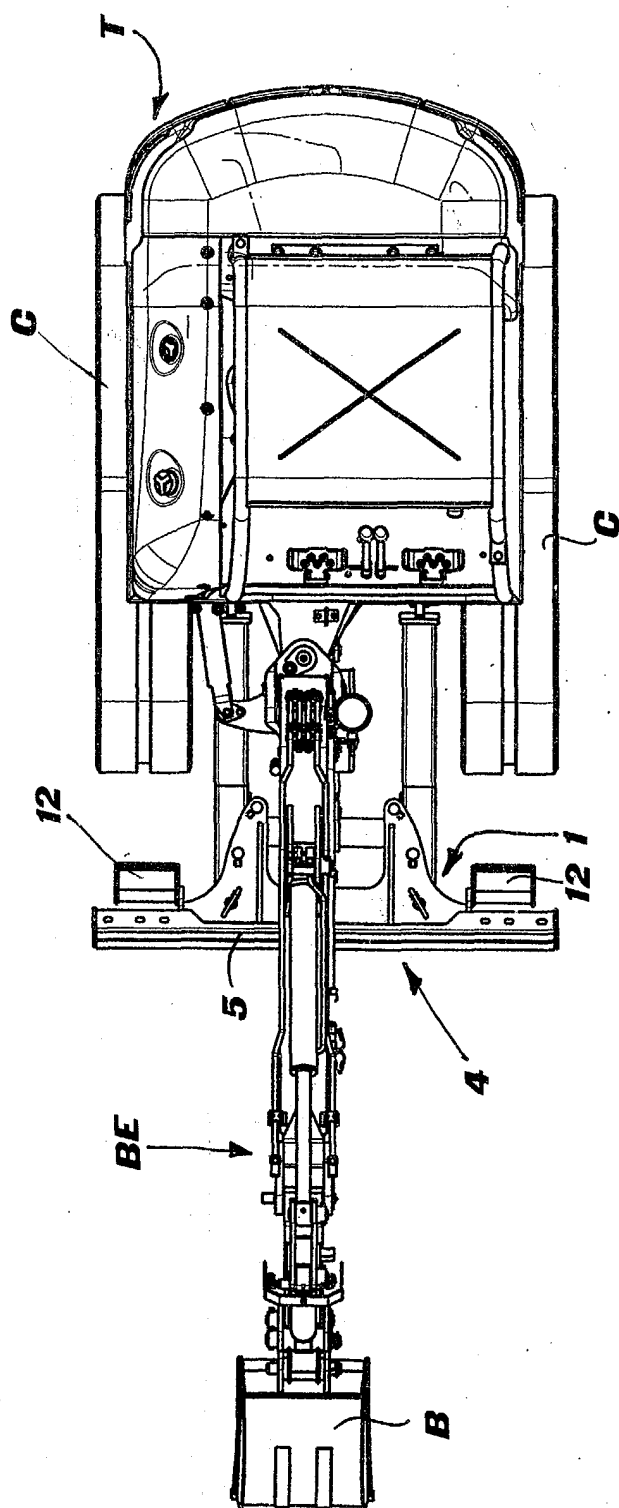


FIG.10



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5125

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Y	* abstract * * column 3, line 1 - column 5, line 10 * * figures 1,6,7 *	4,5	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 July 2003	Examiner Sheppard, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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