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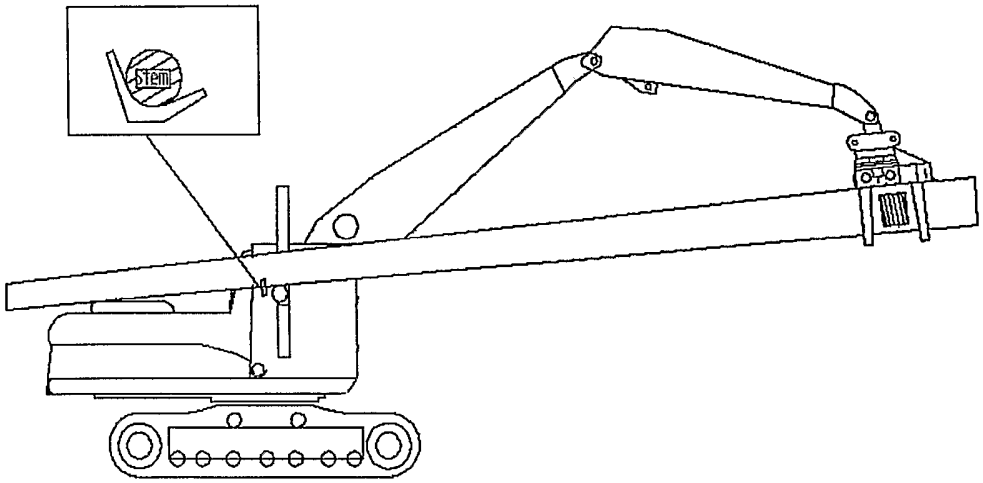

(57) Abstract: The present invention is adapted to provide a support means which includes a base member attached to the main body of lifting equipment where this base member is adapted to define a support surface. The support means also includes a retention member connected to and extending out from the base member where this retention member is angled with respect to the base member. The support means is adapted to be used so that the base member is to support the weight of the section of shaft lifted by lifting equipment, and the retention member is adapted to retain the section of the shaft on the base member. A securing means can also be used in conjunction with such a support means and is also within the scope of the invention discussed.

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SUPPORT MEANS FOR USE IN FORESTRY OPERATIONS

TECHNICAL FIELD

This invention relates to the provision of a support means and a method of using same. Preferably the support means provided may be used in forestry applications to support or otherwise assist in the management or handling of trimmed fallen trees or stems. Reference throughout this specification will also be made to the present invention being used as an additional component of or an element added to an excavator. However, those skilled in the art should appreciate that other configurations of the present invention are also envisioned.

BACKGROUND ART

The forestry industry fells and trims mature trees into stems. Stems are then cut into a number of logs where the positions at which a stem is cut depends on a number of its physical characteristics and hence the quality of the plurality of logs which will be produced from the stem. Normally stems are scanned or analysed prior to cutting to ensure the best possible quality logs are produced.

The scanning and subsequent cutting of stems into logs can be completed using permanent processing plants which move stems along a conveyer system. Stems can be scanned by various different systems well known in the art and also preferably inspected by skilled operators who can identify faults or problems in a stem which cannot necessarily be detected by automated or mechanical systems. The scanned stem then progresses along a conveyer line to be subsequently cut into a number of logs which are in turn sorted by size, length or other related characteristics.

However, the mature trees to be felled and trimmed into stems can be located in remote or inaccessible regions. It can be difficult and costly to transport whole stems to permanent processing plants from such locations. In such instances it is preferable to provide portable processing equipment which can also perform the same function.

Due to the rugged or uneven terrain normally involved it is preferable to use tracked lifting equipment such as that provided for example, through an excavator. Excavators can have a number of different types of working heads attached to the free end of the working arm where these heads be driven by pressurised hydraulic fluid supplied from the excavator. Furthermore many different other types of purpose built forestry machines (not necessarily being excavators) have been developed to work in this field. These custom built machines can be tracked or wheeled and can also include a working arm attached to a rotating frame and a body.

However, the use of excavators or other similar equipment in the cutting (known as bucking) and sorting of logs (known as fleeting) can be somewhat slower than if the same work were completed in a permanent or fixed processing plant using conveyer systems. The working head of an excavator has only one point of support for a stem so cannot lift and cut a stem in a single movement while maintaining a stable lift of the stem once cut. Generally excavators used in such fleeting applications normally make a number of cuts through marked or specific points in a stem and then subsequently, as a second operation, lift and sort the cut logs into a number of bins or piles.

As can be appreciated by those skilled in the art, this two stage operation of an excavator use in a fleeting application can be relatively slow. Many different

movements are required of the excavator to both complete all the cuts involved and subsequently lift and shift all logs into their correct bins or piles.

Furthermore machines and in particular excavator working heads adapted to perform cutting or bucking operations have difficulty sorting, stacking or fleeting the logs produced effectively. This is especially true in specialised machinery which can be adapted to fell, de-limb and cut to length stems but which has difficulty lifting and sorting the resulted logs produced.

It would be preferable to have a support means which could be used to assist in such applications. Preferably a support means which could allow portable forestry fleeting equipment to both lift, support and cut a stem in a single operation while still maintaining a stable grip on the stem would be of advantage.

Felled trees trimmed into stems also need to be moved to processing areas or loaded onto transportation trucks when stems are not to be processed into logs on site in the forest. The need to move stems can cause problems when relatively long or tall stems are involved. Normally excavators with customised working heads are used to grasp and lift stems at one point about their centre of mass, with the excavator then moving to the new location for the stem.

However, with relatively large stems this single point of connection or attachment for the excavator's working head provides the excavator with a relatively unstable load. The free ends of the stem will shake and oscillate as the excavator moves, causing safety problems and potentially resulting in the stem cracking or breaking during transportation.

Some attempts being made to address these problems through the use of "live

heel" and "dead heel" systems fitted or mounted to excavators.

Live heel systems provide a bar extending from the end of the excavator's working arm where this bar provides two attachment points at its opposite ends to a stem. This stabilises the excavator's grip on the stem, but requires a single piece of relatively costly customised equipment to be purchased and used in forestry operations.

As an alternative, a dead heel arrangement can be used which employs a projecting stake extending from the base of the excavator's working arm. The excavator can grasp a section of a stem extending towards one end of same while pivoting the opposite end of the stem into position underneath the dead heel stake. This then provides the stem with two points for connection or attachment and can stabilise the grip of the excavator.

However, the excavator operator must take care to ensure that the end of the stem closest to the cab remains under the dead heel stake during the entire manoeuvring operation involved. Furthermore, there are still limits with respect to the size or length of stems which can be lifted using a dead heel, which is limited by the maximum distance available between the dead heel stake and the working/grasping head of the excavator arm.

An improved lifting or securing system for excavators or other types of lifting equipment employed to move stems on site on the forest floor would be of advantage. Specifically an improved lifting and securing system which provided two points of attachment or connection when a stem is lifted and which allowed relatively long or tall stems to be lifted without safety concerns or have a high chance of the stem breaking when moved would be of advantage.

All references, including any patents or patent applications cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

It is acknowledged that the term 'comprise' may, under varying jurisdictions, be attributed with either an exclusive or an inclusive meaning. For the purpose of this specification, and unless otherwise noted, the term 'comprise' shall have an inclusive meaning - i.e. that it will be taken to mean an inclusion of not only the listed components it directly references, but also other non-specified components or elements. This rationale will also be used when the term 'comprised' or 'comprising' is used in relation to one or more steps in a method or process.

It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

DISCLOSURE OF INVENTION

According to one aspect of the present invention there is provided a support means adapted to be used in association with lifting equipment,

said lifting equipment including a main body, a working arm extending from the main body and being moveable with respect to the main body, and a working head attached to the free end of the working arm, said working head being adapted to be connected to and process a shaft,

wherein the support means includes,

a base member attached to the main body of the lifting equipment, said base member being adapted to define a support surface, and

a retention member connected to and extending out from the base member,

said retention member being angled with respect to the base member,

where the base member is adapted to support the weight of a section of a shaft lifted by the lifting equipment, and the retention member is adapted to retain the section of the shaft supported on the base member.

According to a further aspect of the present invention there is provided a method of processing a shaft using a support member associated with lifting equipment, characterised by the steps of:

(i) connecting a shaft to a working head of lifting equipment, and

(ii) lifting the shaft, and

(iii) positioning a section of the lifted shaft on a base member of a support means, said positioned section being retained on the base member by a retention member of the support means, and

(iv) processing the shaft with the working head at the connection point of the

working head to the shaft, and

(v) moving the shaft over the base member of the support means and connecting the working head to a new section of the shaft.

According to yet another aspect of the present invention there is provided lifting equipment which includes:

a main body,

a working arm extending from the main body and moveable with respect to the main body, and

a working head attached to the free end of the working arm, said working head being adapted to be connected to and process a shaft,

a support means which includes, a base member attached to the main body of the lifting equipment, said base member being adapted to provide or define a support surface, and a retention member connected to and extending out from the base member, said retention member being angled with respect to the base member,

wherein the base member is adapted to support the weight of a section of a shaft lifted by the lifting equipment, and the retention member is adapted to retain the section of the shaft supported on the base member.

The present invention is adapted to provide a support means preferably used in the management or handling of shafts by lifting equipment. A shaft to be support in conjunction with the present invention may be any type of element or member which has a length substantially greater than its width or diameter.

Reference throughout this specification will also be made to the shaft supported in conjunction with the present invention being tree stems. However, those skilled in the art should appreciate that other types of shafts may necessarily be supported or manipulated in conjunction with the present invention and reference to stems only throughout the specification should in no way be seen as limiting.

Preferably the support means provided may be adapted to be used in combination or association with lifting equipment. The lifting equipment may provide the motive power and working elements used to grasp, lift or otherwise manipulate a stem, whereas the support means may be used in an assisting or support role as required.

Preferably the lifting equipment employed consists of a main body and working arm extending from the main body which is moveable with respect to the main body. A working head is preferably connected to the free end of the working arm where this working head is used to grasp, connect to or otherwise facilitate the lifting of a stem using the working arm. Furthermore in some instances the main body of the lifting equipment may be formed from or incorporated a base with a rotating body connected to such a base. The rotating body may then slew or rotate with respect to the base if required.

In a further preferred embodiment the working head of the lifting equipment may be adapted to both grasp or connect to a section of a stem in addition to being adapted to cut through the stem adjacent to the section grasped or connected to. This allows the working head and associated lifting equipment to be used in forestry fleeting applications to both manipulate and cut a stem into a plurality of logs.

Reference throughout this specification will also be made to the lifting equipment with which the present invention is to be used or associated being an excavator. Excavators are well known as efficient types of lifting equipment which normally are equipped with track based drive systems capable of moving the excavator over rough or boggy terrain. Reference throughout this specification will also be made to the support means provided being connected to the main body of an excavator. However, those skilled in the art should appreciate that other types of lifting equipment and other configurations of the support means may also be implemented in accordance with alternative embodiments of the present invention.

Preferably the support means includes a base member which is adapted to be attached to the main body of the excavator involved. In a further preferred embodiment the base member may be attached to a side of the excavator main body and preferably project out at an angle of approximately 90° to the excavator main body.

Preferably the base member may define a support surface which can be used to support or otherwise bear the weight of a section of a stem located or positioned on same. The base member's connection to the main body can therefore be used to transfer the weight supported onto the excavator.

Preferably the support means also includes a retention member connected to the base member. This retention member may extend out from the base member and preferably be angled with respect to the base member. In a further preferred embodiment the retention member may be angled upwards with respect to the base member. This angle provided in the retention member may bend the projecting free end of the support means up towards the uppermost

portions of the main body of an excavator and thereby define a frame with these base member and exterior surface of the main body within which a section of a stem is to be retained.

In a further preferred embodiment both the base member and retention member may be formed from relatively straight beams with substantially rectangular cross sections. This will provide a flat level support surface from the base member and a flat angled retention surface for the retention member.

However, those skilled in the art should appreciate that both the base member and retention member may be formed through a single curve element if required which can extend out from the body of an excavator and then provide or define a single progressive support surface and retention surface.

This configuration of the support means allows it to support a section of a stem which is lifted by the excavator. A section or end of the stem may be supported on the base member and retained between the retention member and exterior surface of the excavator's main body, while at the opposite end of the stem the working head may be used to grasp and in combination with the working arm, lift the opposite end of the stem from the ground. This allows the excavator to subsequently rotate its main body with respect to its base or tracks without the stem being dragged along the ground and potentially broken. Furthermore, with the use of a support means the excavator may also move to a new location again without needing to drag the stem along the ground.

Furthermore, when an additional processing element or component is provided in the working head to cut through a stem, the stem may be bucked and fleeted into a number of different length or sized logs in a single operation. The lifted

and supported stem may be cut at its connection position to the working head, with the working head then subsequently being used to draw or move the stem forward and then to grasp a new additional section of the stem at which a second or further cut is to be made. Cuts may be made in the stem when the end of the stem projecting away from the working head will fall onto a pile or bin of logs sorted into the same length or size. The excavator may then move the working head adjacent to each appropriate bin prior to a cut being made, with the cut logs simply falling from the end of the working head into the correct bin or pile.

In a further preferred embodiment the base member may be adapted or configured to assist in the movement of a stem over its support surface. For example, in one preferred embodiment the base member may include a series of rollers or a rotating surface as its support surface which will present a low friction face to any stem drawn across same. Alternatively, in other embodiments the support surface may be formed with a substantially convex curved surface to present a minimum surface area for friction forces to act against a shaft drawn over same.

In some embodiments the support means may also be adapted to assist in the removal of branches from a recently felled stem. In such instances a cutting face or edge may be provided in conjunction or combination with the support surface of the base member. Such a cutting edge can intercept projecting branches of a stem as the stem is drawn over the support surface to subsequently cut branches from the stem.

Such a cutting edge or blade may be provided in some embodiments through a separate component or fixture attached to the main body of an excavator

adjacent to the support surface of a base member. Alternatively, in other instances this cutting blade may be integrated into the constructional or form of the support surface and base member itself. Those skilled in art should appreciate that a number of different implementations of a branch removing cutter or blade may be implemented in conjunction with the present invention.

The provision of a branch removing blade can allow the movement or passage of a stem over or along the support surface to be eased. The bottom or rear branches of a stem may be removed as they are drawn over the region of in which the support surface is located.

In such embodiments the lifting equipment (or preferably an excavator) may also incorporate some form of protective shielding or enclosure. Such a shield or enclosure may use to protect the operator of the lifting equipment from branches as a stem is drawn over the base member's support surface.

Those skilled in the art should appreciate that the present invention may be adapted to be used with stems that have previously had their branches removed, or alternatively still having a number of branches attached. Adaptations and modifications may be made to the present invention as required depending on the particular application or process in which it is to be used.

According to a further aspect of the present invention there is provided a securing means adapted to be used in association with lifting equipment,

said lifting equipment including a main body, a working arm extending from the main body and moveable with respect to the main body, and a working head attached to the free end of the working arm, said working head being adapted to

be connected to a shaft,

wherein the securing means includes

a blocking member attached to the main body of the lifting equipment, said blocking member being adapted to provide or define a blocking surface, and

a trapping member connected to and extending out from the blocking member, said trapping member being angled with respect to the blocking member,

wherein the blocking member is adapted to block the movement of a section of a shaft lifted by the lifted equipment, and the trapping member is adapted to trap the section of the shaft blocked in contact with the blocking member.

According to a further aspect of the present invention there is provided a securing means substantially as described above provided in combination with a support means substantially as described above.

Accordingly another aspect of the present invention there is provided lifting equipment which includes both a support means substantially as described above and a securing means substantially as described above.

According to yet another aspect of the present invention there is provided a method of using a securing means associated with lifting equipment, characterised by the steps of:

(i) connecting a shaft to the working head of lifting equipment, and

(ii) lifting the shaft, and

(iii) positioning a section of the lifted shaft in contact with a blocking member

for securing means, and

(iv) trapping the section of the shaft in contact with the blocking member using a trapping member, and

(v) moving the shaft to a new location.

According to yet another aspect of the present invention there is provided lifting equipment which includes

a main body, and

a working arm extending from the main body and moveable with respect to the main body, and

a working head attached to the free end of the working arm, said working head being adapted to be connected to a shaft, and

a securing means which includes a blocking member attached to the main body of the lifting equipment, said blocking member being adapted to provide or define a blocking surface, and a trapping member connected to and extending out from the blocking member, said trapping member being angled with respect to the blocking member,

wherein the blocking member is adapted to block the movement of a section of a shaft lifted by the lifted equipment, and the trapping member is adapted to trap the section of the shaft blocked in contact with the blocking member.

Preferably the present invention may also encompass or be used to provide a securing means to be used in a support role during lifting and manoeuvring operations with respect to a number of different types of shafts. In particular,

reference throughout this specification will also be made to such a securing means being used to secure stems lifted by excavators during the movement of stems from one location to another.

However, those skilled in the art should appreciate that, as is the case with respect to the support means described above, references to stems, and excavators used as the lifting equipment in conjunction with such securing means should in no way be seen as limiting. Furthermore, the applications considered for the securing means discussed need not require the working head of an excavator to be adapted to both grasp and cut a stem.

In a preferred embodiment the securing means may be provided in conjunction or combination with the support means discussed previously. Preferably the securing means may be provided in combination with the support means to increase the number of functions or operations the combined system may perform. However, those skilled in the art should appreciate that both the securing means and support means discussed throughout this specification may also be implemented or provided in isolation from one another if required.

Preferably a securing means may be employed to provide two points of connection or attachment for a lifted stem to an excavator. The first point of contact may be provided through the working head of the excavator whereas the securing means may provide the second point of contact required. This provides the excavator with a stable grip on a stem when lifted and potentially allows relatively long or tall stems to be lifted without fear of same breaking or causing safety concerns.

Preferably the securing means provided includes a blocking member adapted to

be attached to the main body of the excavator involved. In a further preferred embodiment the blocking member may be attached to the side of the excavator main body and may project out from this body at an angle of approximately 90° to the end of the excavator working arm.

Preferably the blocking member may define a blocking surface which can be used to block, stop or otherwise locate a section of a lifted stem placed underneath the blocking member. Any turning force or torque applied by the stem through its connection to the excavator's working head at a point offset from the stem's centre of mass will therefore be balanced or negated by the blocking member.

Preferably the securing means also includes a trapping member connected to the blocking member. This trapping member may extend out from the blocking member and preferably be angled with respect to the blocking member.

In a further preferred embodiment the trapping member may be angled downwards with respect to the blocking member. The angle provided in the trapping member may bend the projecting free end of the securing means away from the outermost portions of the main body of the excavator, thereby providing a downward facing partial U-shaped frame within which a section of a stem may be inserted and trapped.

However, those skilled in the art should appreciate that both the blocking member and trapping member may be formed through a single curve element if required which can extend out from the body of an excavator and then provide or define a single progressive blocking surface and trapping surface.

This configuration of the securing means allows it to block any upward pivoting

motion of a stem which has been grasped by the excavator's working head at a point displaced from the centre of mass of the stem. This offset connection position can in turn cause an upwardly directed torque or turning force to be applied to the distal end of the stem. The securing means can be used to balance or negate this turning force by trapping the section of the stem against the blocking surface defined by the blocking member.

The provision of such a securing means allows an excavator to use a stable two point connection to a stem when lifted. This allows the excavator's working head to grasp a section of a stem offsets from its centre of mass. The closer end of the stem to this grasped section may then be tucked underneath or into the securing means provided to in turn hoist or pivot the opposite end of the stem off the ground and to point same upwards. This in turn allows relatively long or tall stems to be lifted and transported by an excavator both safely and with a reduced risk of the stem breaking during transportation.

In a further preferred embodiment both the blocking member and trapping member may be formed from relatively straight beams with substantially rectangular cross sections. This will provide a flat, level, blocking surface from the blocking member and a flat angled trapping surface for the trapping member.

A support means as configured in accordance with the present invention may provide many potential advantages over the prior art, in that it can allow both fleeting to occur at the same time as bucking or cutting of a stem into length.

In a preferred embodiment an excavator or other similar type of equipment may maintain a stationary position during fleeting and bucking operations, slewing or

rotating its main body around to drop a cut log product into an appropriate bin or pile of products. In this way lifting equipment can be located in the centre of an array piles of sorted log products and may fleet and buck a lifted stem to each appropriate pile through simply slewing the main body of the equipment into the correct position or orientation with respect to a specific pile.

BRIEF DESCRIPTION OF DRAWINGS

Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

Figures 1a & 1b illustrate prior art support means used in conjunction with existing lifting equipment, and

Figures 2a & 2b illustrate a support means and a securing means configured in accordance with a preferred embodiment when used with a lifting excavator.

Figure 3 illustrates the use of securing means shown with respect to figures 2a and 2b.

Figure 4 shows a securing means similar to that discussed with respect to figure 2b which also includes a branch cutter blade.

BEST MODES FOR CARRYING OUT THE INVENTION

Figures 1a & 1b illustrate prior art support means used in conjunction with existing lifting equipment.

Figure 1a illustrates a dead heel lifting system whereas figure 1b illustrates a live heel lifting system. As can be seen from figure 1b, the stem lifted has provided two distinct connection points to the excavator's arm but at the cost of requiring a relatively large and customised working head to be used.

Conversely the dead heel system shown with respect to figure 1a requires the provision of a relatively small projection stake near the base of the excavator's working arm. However, the operator of the excavator must be careful when the stem and excavator arm are moved to ensure that the near end of the stem stays under the dead heel stake. In addition, the maximum height or length of stems to be lifted by a dead heel system is limited by the maximum distance which can be provided between the dead heel stake and the working head of the excavator arm.

Figures 2a & 2b illustrate a support means and a securing means configured in accordance with a preferred embodiment of the present invention when used with a lifting excavator. In the situation shown, the support means (1) is employed to support a stem (2) lifted by the excavator (3).

The support means includes or consists of a support member (1a) extending out from the side or main body of the excavator (3), and a retention member (1b) which extends from the end of the support member (1a) and is angled upwards with respect to the support member (1a).

The excavator (3) also has attached a securing means (4). The securing means consists of or includes a blocking member (4a) extending out from the main body of the excavator (3), and a trapping member (4b) which extends from the opposite end of the blocking member and is angled downwards with respect

to the blocking member.

Figure 2a shows a front view of the support means (1) being used whereas figure 2b shows a side cross section view of the support means (1) when used. As can be seen from these figures the support means (1) allows the working head of the excavator to lift a stem near one end of same. The opposite end or section of the stem may then be supported by the support means (1) to lift the entire stem off the ground.

The support means (1) can be used in fleeting operations where the working head of the excavator is capable of both lifting, grasping and also cutting through the lifted section of stems. This is illustrated with respect to figure 2b where the end of the stem pointing away from the front of the excavator can be cut off the stem and allowed to drop into a sorted bin or pile of similar log products. The stem may then be slid forward over the support surface provided by the support means and the stem grasped at its opposite end by the excavator's working head at a new position at which a further cut is to be made.

Figure 3 illustrates the securing means shown with respect to figures 2a and 2b.

In the situation shown with respect to figure 3, the securing means (4) is used to trap or secure one end of a stem when lifted by the excavator (3). The securing means (4) blocks upwards pivoting motions of the end of the stem when the stem is grasped by the excavator's working head at a point offset from the centre of mass of the stem. The securing means will then block the pivoting force involved and provide a second secure connection of the stem to the excavator. The trapping member (4b) will retain the section of the stem involved in contact with the blocking surface defined or provided by the blocking member

(4a). This allows the excavator to then move to a new location for the stem involved with a stable grasp on the stem.

Figure 4 shows a securing means similar to that discussed with respect to figure 2b which also includes a branch cutter blade.

As can be seen from figure 4 a branch cutter blade may be attached to the main body of an excavator so that the blade will remove log branches of stem as the stem is drawn forward by the working head of the lifting equipment and over the support surface of the support means. This will therefore ease the passage of the stem forward over the support means during fleeting and bucking operations.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof.

WHAT I/WE CLAIM IS:

1. A support means adapted to be used in association with lifting equipment, said lifting equipment including a main body, a working arm extending from the main body being moveable with respect to the main body, and a working head attached to the free end of the working arm, said working head being adapted to be connected to and process a shaft, wherein the support means includes,

   a base member attached to the main body of the lifting equipment, said base member being adapted to define a support surface, and

   a retention member connected to and extending out from the base member, said retention member being angled with respect to the base member,

   where the base member is adapted to support the weight of a section of a shaft lifted by the lifting equipment, and the retention member is adapted to retain the section of the shaft supported on the base member.

2. A support means as claimed in claim 1, wherein the shaft processed is a tree stem.

3. A support means as claimed in any one of claims 1 or 2, wherein the lifting equipment is an excavator.

4. A support means as claimed in any previous claim, wherein the base member is attached to the side of the excavator at an angle of

approximately 90°.

5. A support means as claimed in any previous claim, wherein the retention member is angled upwards with respect to the base member.

6. A support means as claimed in any previous claim, wherein in use the support member supports one end of a shaft while the other end of the shaft is grasped and held by the working head of the lifting equipment.

7. A support means as claimed in any previous claim, wherein the base member is adapted to assist in the movement of a shaft over the support surface of said base member.

8. A support means as claimed in claim 7, wherein the base member's support surface includes at least one roller.

9. A support means as claimed in claim 7, wherein the base member includes a substantially concave support surface.

10. A securing means adapted to be used in association with a support means as claimed in any previous claim, wherein the securing means includes

a blocking member attached to the main body of the lifting equipment, said blocking member being adapted to provide or define a blocking surface, and

a trapping member connected to and extending out from the blocking member, said trapping member being angled with respect to the blocking member,

wherein the blocking member is adapted to block the movement of a

section of a shaft lifted by the lifted equipment, and the trapping member is adapted to trap the section of the shaft blocked in contact with the blocking member.

11. A securing means as claimed in claim 10, which in use is employed to support a shaft during movement of said shaft.

12. A securing means as claimed in any one of claims 10 or 11, wherein a section of a shaft is located underneath the blocking member during movement of said shaft.

13. A securing means as claimed in any one of claims 10 to 12, wherein the trapping member is angled with respect to the blocking member.

14. A securing means as claimed in any one of claims 10 to 13, wherein the blocking and trapping members define a downward facing partial U frame.

15. Lifting equipment which includes:

a main body,

a working arm extending from the main body being moveable with respect to the main body, and

a working head attached to the free end of the working arm, said working head being adapted to be connected to and process a shaft,

a support means which includes a base member attached to the main body of the lifting equipment, said base member being adapted to define a support surface, and a retention member connected to and extending out from the base member, said retention member being angled with respect

to the base member,

wherein the base member is adapted to support the weight of a section of a shaft lifted by the lifting equipment, and the retention member is adapted to retain the section of the shaft supported on the base member.

16. Lifting equipment as claimed in claim 15 which also includes

a securing means which includes a blocking member attached to the main body of the lifting equipment, said blocking member being adapted to provide or define a blocking surface, and a trapping member connected to and extending out from the blocking member, said trapping member being angled with respect to the blocking member,

wherein the blocking member is adapted to block the movement of a section of a shaft lifted by the lifted equipment, and the trapping member is adapted to trap the section of the shaft blocked in contact with the blocking member.

17. A method of processing a shaft using a support member associated with lifting equipment, characterised by the steps of:

I. connecting a shaft to a working head of lifting equipment, and

II. lifting the shaft, and

III. positioning a section of the lifted shaft on a base member of a support means, said positioned section being retained on the base member by a retention member of the support means, and

IV. processing the shaft with the working head at the connection point of the

working head to the shaft, and

V. moving the shaft over the base member of the support means and connecting the working head to a new section of the shaft.

18. A support means substantially as herein described with reference to and as illustrated by the accompanying figures 2a, 2b and 3 and examples.

19. Lifting equipment substantially as herein described with reference to and as illustrated by the accompanying figures 2a, 2b and 3 and examples.

20. A securing means substantially as herein described with reference to and as illustrated by the accompanying figures 2a, 2b and 3 and examples.

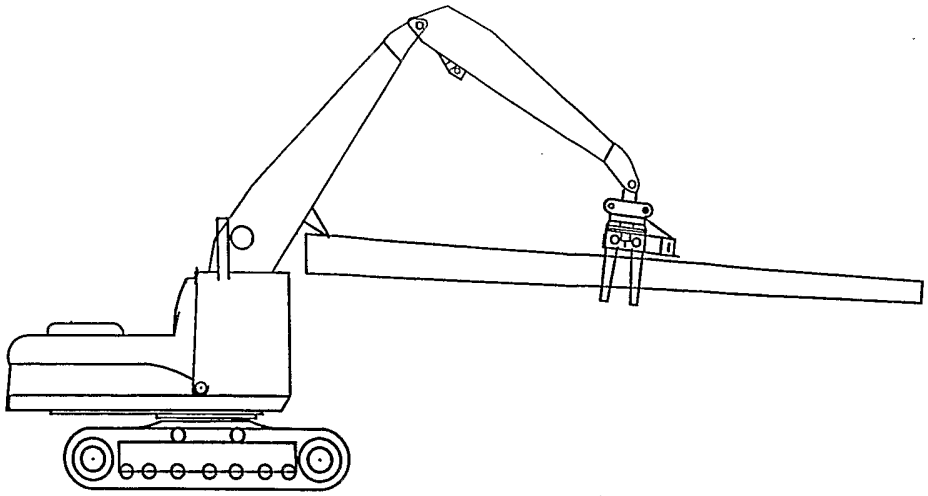


FIGURE 1A

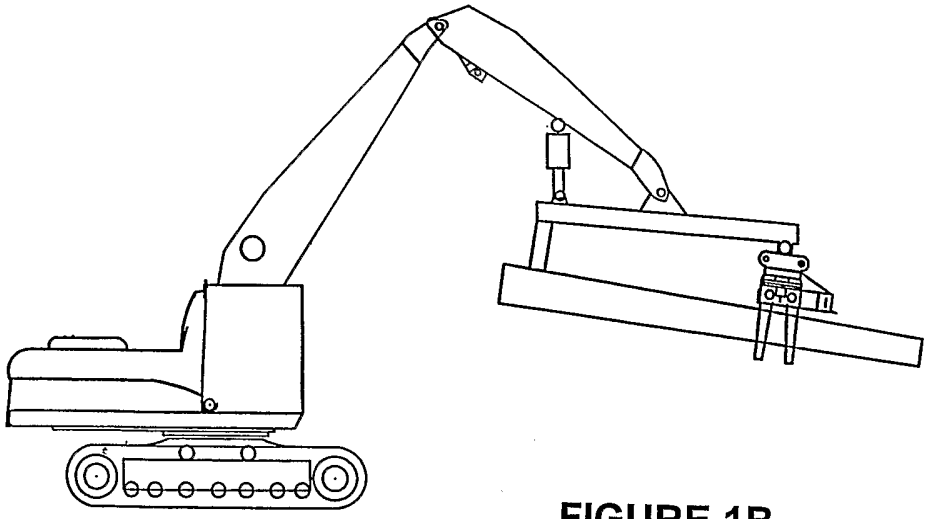


FIGURE 1B

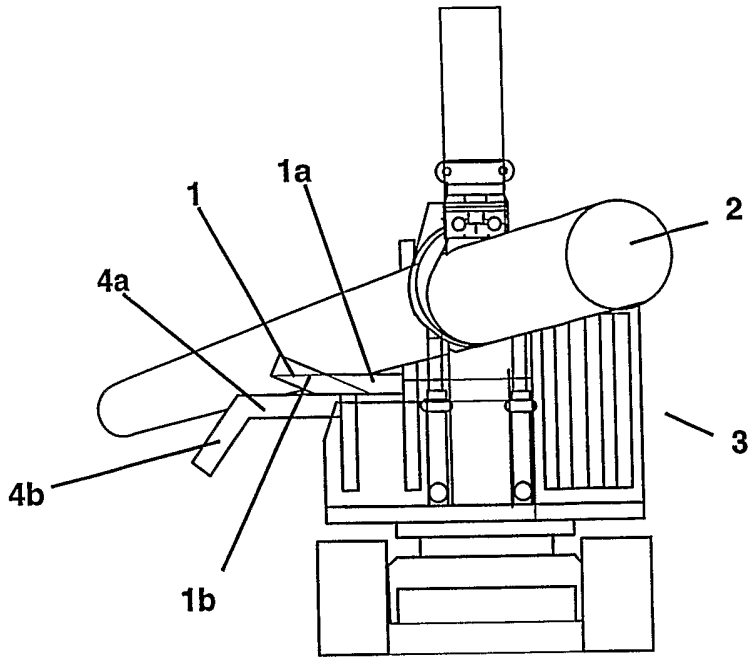


FIGURE 2A

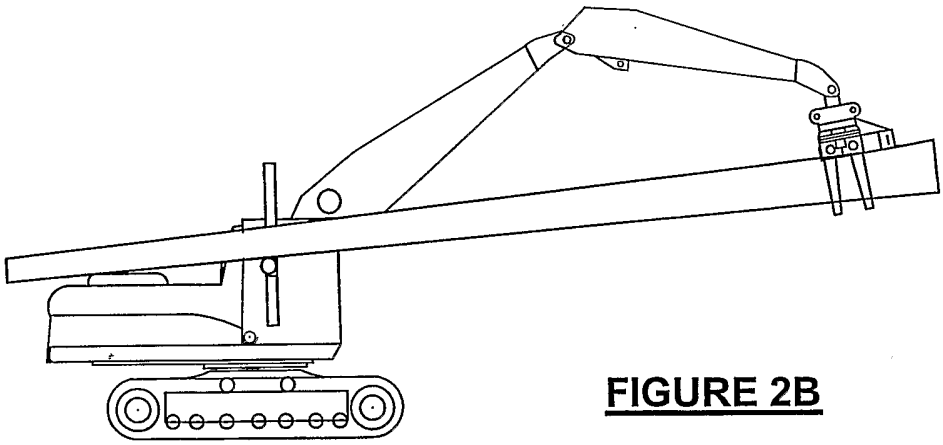


FIGURE 2B

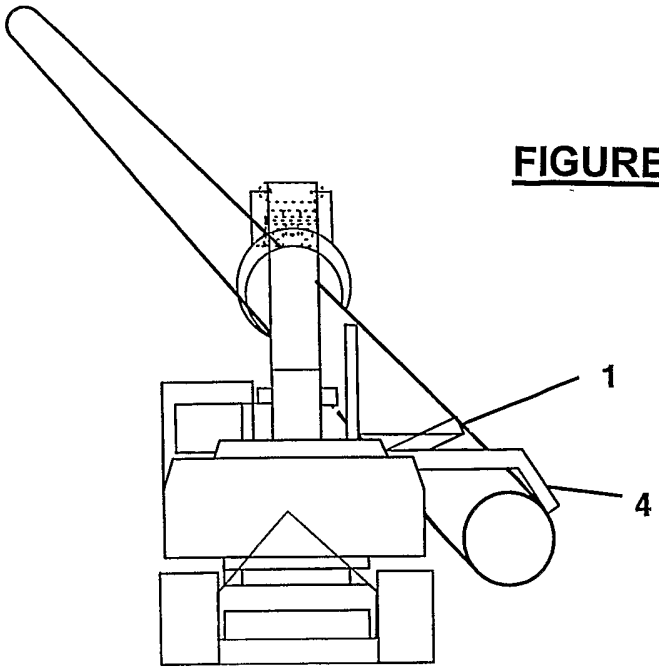
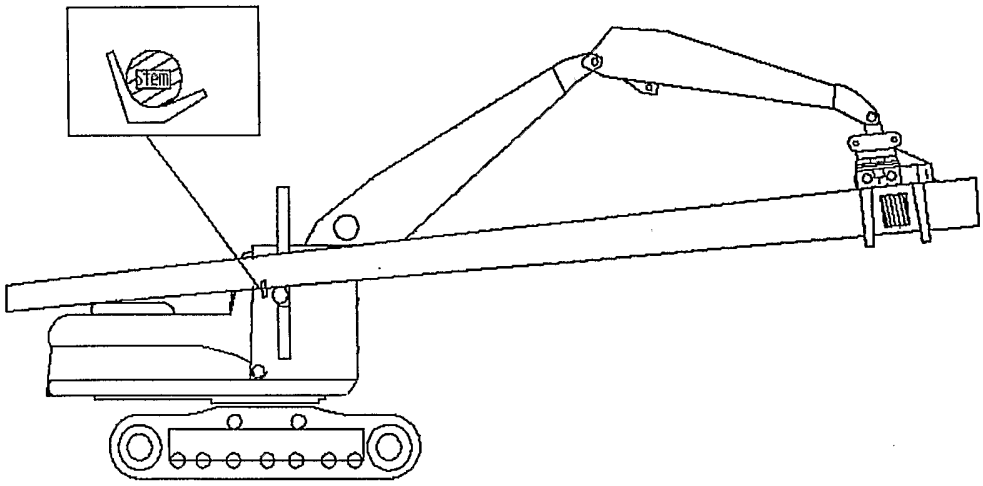


FIGURE 3

FIGURE 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ2004/000206

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: A01G 23/08; B66C 13/06

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)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC A01G 23/08; B66C 13/06

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI: IPC A01G, E02F, B66C, F16L with keywords such as support, lift, shaft, process and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3833034 A (MENZEL et al) 3 September 1974 Whole document	1-13, 15-20
X	US 5107912 A (CÔTÉ et al) 28 April 1992 Whole document	1-3, 5-7, 9-17
X	US 4416311 A (GEMMELL-MURDOCH) 22 November 1983 Whole document	1, 2, 4-12, 15-17
X	SU 793491 A (SILAVA RES PRODN) 7 January 1981 Whole document	1, 2, 4-12, 15-17

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"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
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 November 2004	15 NOV 2004
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer **JEFFREY CARL** Telephone No : (02) 6283 2543

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ2004/000206

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3960190 A (SMITH) 1 June 1976 Whole document	1, 2, 4-12, 15-17
X	US 3905407 A (GUY et al) 16 September 1975 Whole document	1, 2, 4-12, 15-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NZ2004/000206

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	3833034	AU	57370/73	CA	986822	DE	2410600
		FR	2222010	SE	7403625	SU	579843
US	5107912	CA	2029958				
US	4416311	AU	65742/80	CA	1138750	EP	41515
		FI	803745	NZ	195749	WO	1981/001496
SU	793491	NONE					
US	3960190	AU	14628/76	CA	1046908	DE	2625344
		FR	2312947	GB	1502068	SE	7606235
US	3905407	AU	54928/73	CA	967079	CA	968670
		CA	974148	CA	974220	CA	975261
		CA	975262	DE	2321049	US	3986542

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX