

POST LIFTER

TECHNICAL FIELD

A post lifter is disclosed for assisting with the removal of a post from the earth.

- 5 The lifter finds particular application in assisting with the removal of posts that comprise at least one elongate flange extending along the post length (e.g. Y- or T-fence posts), and will be described in this context. However, it should be appreciated that the lifter is not limited to use on such posts.

BACKGROUND ART

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Steel posts have been known for many years that are roll-formed to have a Y-shaped or T-shaped profile (i.e. in end view). The post may be used in e.g. fencing and can take the form of a picket. In this case the post may be provided (e.g. cut) with a pointed end to facilitate post driving into the earth. In some applications it is known to

15 mould Y- or T-posts from a plastic material (e.g. for use in electric fencing). The Y-shaped or T-shaped profile is imparted by three elongate flanges extending for the length of the post and projecting out from an elongate central axis of the post.

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When such posts are driven into the earth, each of the flanges frictionally engages with the earth, on either side of the flange, to generally resist removal from the

20 earth and to resist lateral movement, etc. Indeed, the degree of frictional engagement can be such as render difficult manual removal of the post. Thus, mechanical post removal apparatus have been developed.

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One such apparatus is disclosed in AU 198063654. This document discloses a post lifter having a handle that pivots around a support, such that downward movement

25 of a first portion of the handle results in upward movement of a second portion thereof. The second portion of the handle is connected via opposing link arms to a post gripping arrangement which includes a pair of opposing jaws that grip onto a flange of the post. The jaws are movable relative to each other during pivoting of the handle, from an open position (handle first portion raised) in which a space is defined between the jaws to

30 receive the post flange, and a gripping position (handle first portion lowered) in which the jaws grip onto the post flange. Once so gripped, a further lowering movement of the

handle first portion causes the gripping arrangement to forcibly lift the post out of the earth.

WO 2009/043079 discloses an improvement over AU 198063654 in which the jaws (grippers 23) are each provided with a curved serrated edge (31) to better grip onto the post flange. However, such a serrated edge may damage a surface of the post (e.g. it may abrade a galvanising or painted layer thereon). This can result in the posts not being reusable. Machining of a serrated edge onto a curved surface also introduces additional manufacturing steps and complexities.

The above references to the background art do not constitute an admission that the art forms a part of the common general knowledge of a person of ordinary skill in the art. The above references are also not intended to limit the application of the post lifter as disclosed herein.

SUMMARY OF THE DISCLOSURE

In a first aspect there is disclosed a post lifter for assisting with removal of a post from the earth. In this regard, the post lifter may be such as to commence removal of the post (i.e. provide initial dislodgement from the earth) to then enable easy and subsequent manual removal of the post. Alternatively, the post lifter can be configured to lift a majority (if not all) of the post out of the earth.

In either case, the post lifter of the first aspect comprises opposing jaws. At least one of those jaws is movable between an open position in which a space is defined between the jaws to receive therein a portion of the post, and a gripping position in which the jaws have moved closer together to grip onto the post portion. The configuration of the post lifter is such that actuation of the post lifter causes the post to commence lifting out of the earth.

In the post lifter of the first aspect a surface of at least one of the jaws comprises a ball detent for engagement against the post portion when the at least one jaw is in the gripping position.

The employment of a ball detent has been found to be at least as effective as a serrated surface (e.g. as employed in WO 2009/043079) but without causing or

resulting in any noticeable or relevant damage to the post. In addition, such a detent is easy to manufacture in the at least one jaw.

The ball detent may be spring-loaded and may be partially recessed into the surface of the at least one jaw (i.e. the surface that engages with the post flange in use).

5 In one embodiment the surface comprising the ball detent can be curved. Such a curved surface can engage against the post portion during movement between the open and gripping positions and during actuation of the post lifter (i.e. the curved surface can help to facilitate jaw engagement with and gripping against the post, in that it can “roll) against the flange during jaw actuation). Because the detent may be located in just one
10 position along this curved surface, manufacture of the jaw is still comparatively simple.

Whilst conceivably just one jaw can comprise the surface with the ball detent, typically each jaw comprises the surface with the ball detent. Thus each jaw can engage against a respective side of the post portion.

If just one jaw comprises the surface with the ball detent, the other jaw may be
15 fixed or movable. However, typically each jaw is movable between the open and gripping positions.

In one form the post to be removed comprises at least one elongate flange extending for at least part of its length. This flange can define the post portion to be engaged and gripped by the jaws. However, it should be appreciated that the post lifter
20 of the first aspect is not limited to flange-type posts and may be adapted for use with rod-, bar- cylindrical and even tubular-type posts, etc. In such latter applications, the jaw spacing, jaw surface shape, etc can be re-adapted accordingly.

In this one form, the post may be of a type that comprises multiple elongate flanges extending along its length. One or each such flange may be engaged and
25 gripped by the jaws. For example, the post lifter may be used to remove so-called Y- and T-posts, and be operable with one or more of the three flanges of such posts. Alternatively, the post lifter may be operable with either a major (stem or stalk) flange or minor (wing) flanges of such posts.

In one embodiment each jaw may be pivotally mounted on a jaw support to
30 pivot between the open and gripping positions. The jaw support can take the form of a

plate, and each jaw can be pivotally mounted to the plate at or adjacent to an in-use proximal end of the jaw.

5 The jaw support may be movable up and down with respect to and along a frame of the post lifter. For example, the frame may comprise a base for location on the earth (e.g. on the ground adjacent to the post). A support post can extend up from the base, and the jaw support can be fixedly mounted to a sleeve that is in turn locatable on, for sliding up and down, the support post during actuation of the post lifter.

10 Whilst the actuation of the jaws, jaw support, sleeve, etc can be automated, when the post lifter is embodied as a manually operated mechanical apparatus, the actuation of these components can be effected manually.

15 In this regard, when embodied as a manually operated mechanical apparatus, the post lifter can comprise a handle that is pivotally mounted, intermediate its ends, to an in-use upper end of the support post. A distal end of the handle can have a fork arrangement affixed thereto. This fork arrangement can be coupled (e.g. pivotally) to two linkage arms respectively.

20 A remote (opposite) end of each linkage arm can be coupled (e.g. pivotally) to a respective jaw so as to cause it to pivot on the jaw support during actuation of the post lifter. The linkage arm coupling to the jaw can be at or adjacent to a distal end of each jaw (i.e. spaced from where the in-use proximal end of the jaw is mounted to the jaw support).

25 In at least one embodiment, a post lifter for assisting with removal of a post from the earth can comprise a support post and opposing jaws mounted with respect to the support post. At least one of the jaws may be movable between an open position in which a space is defined between the jaws to receive therein a portion of the post, and a gripping position in which the jaws are moved closer together to grip onto the post portion and such that actuation of the post lifter causes the post to commence lifting out of the earth, with a surface of at least one of the jaws comprising a detent for engagement against the post portion when the at least one jaw is in the gripping position. A handle can be pivotally mounted, intermediate its ends, to an in-use upper end of the support post, and wherein a distal end of the handle comprises two linkage

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arms coupled thereto, with a remote end of each linkage arm being coupled to a respective jaw so as to cause it to pivot during actuation of the post lifter.

When embodied as a manually operated mechanical apparatus, a method of actuating the post lifter can comprise at least the following steps:

- 5 - lifting a proximal end of the handle so as to move the jaws into the open position;
- locating the post portion between the jaws;
- lowering the proximal end of the handle until the jaws move into the gripping position.

This can bring the at least one detent into engagement against the post portion.

- 10 The post lifter is now ready for post dislodgement from the earth. In this regard, the method of actuating the post lifter can comprise the further step of urging the proximal end of the handle lower. This causes the jaws to grip hard against the post portion, at the respective detent(s), thereby causing the distal end of the handle and the linkage arms to draw the sleeve (and thus the jaw support) slidingly up on the support post,
- 15 whereby removal of the post from the earth commences. By this method, the post might be fully removed, or may be dislodged from the earth sufficiently for a final manual removal.

The removed post may be repaired, reused, or discarded.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

Notwithstanding any other forms which may fall within the scope of the post lifter as defined in the Summary, specific embodiments will now be described, by way of example only, with reference to the accompanying drawings in which:

- Figures 1A and 1B respectively show a front view and a side view of a post
- 25 lifter embodiment, with Figure 1C showing a detailed view of one of the jaws;

 Figures 2A to 2C respectively show three different perspective views of the assembled post lifter of Figure 1;

 Figure 3 shows a perspective detail of the assembled post lifter of Figure 1; and

- Figure 4 shows a perspective detail of the assembled post lifter of Figure 1 when
- 30 removing a post.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

In the following detailed description, the post lifter is described and shown as a manually operable mechanical apparatus. However, it should be appreciated that the post lifter can be embodied as an automated mechanical apparatus, with some or all of the various components: jaws, jaw support, sleeve, etc able to be automated (e.g. in the form of a pneumatic-, electric- or fossil fuel- motor-driven post lifter).

Referring now to the drawings, a post lifter for assisting with removal of a post P from the earth is shown in the form of a post puller 10. The post puller 10 as shown is configured upon actuation to commence lifting of the post P out of the earth (i.e. to provide initial dislodgement of a post from the earth). This enables easy and subsequent manual removal of the post (i.e. by hand).

The post puller 10 comprises a pair of opposing jaws 12. The jaws 12 are pivotally mounted in the puller for movement between open and gripping positions. In the open position a space is defined between the jaws to receive therein a portion (i.e. flange F) of the post P. In the gripping position the jaws have moved closer together to grip onto the post portion (flange F) when located therebetween.

As shown in figure 1C, a curved surface 14 of each of the jaws 12 comprises a detent in the form of a ball detent 16 located therein (ie. partially recessed into the surface 14). The ball detent 16 is able to engage against the post when each jaw is in the gripping position. The use of a ball detent has been observed to not cause or result in any noticeable or significant damage to the post in use of the puller 10. In addition, the ball detent 16 is easy to manufacture and is easy to assemble into the curved surface 14 of the jaw 12. The ball detent 16 may optionally be spring-loaded (e.g. by a leaf- or like-spring located under the ball within the recess). The spring can generally urge the ball outwards, but can also help to prevent damage to the post surface.

The curved surface 14 of each of the jaws 12 is able engage against (i.e. roll around) an adjacent surface of the post during jaw inward pivoting movement from the open to the gripping positions, until the ball detent 16 comes into engagement with the adjacent surface of the post. The curved surface 14 also results in only a point force being applied via the ball detent 16 during actuation of the post puller (i.e. when the jaws grip against the post during pulling/lifting).

Usually the post to be removed comprises at least one elongate flange F extending for at least part or all of its length, with this flange defining the post portion to be engaged and gripped by the jaws 12. Usually the post is of a type that comprises multiple elongate flanges extending along its length. Each such flange may be engaged and gripped by the jaws. For example, the post puller may be used to remove so-called Y- and T-posts (e.g. steel or plastic Y- or T-fence posts) – see Figure 4. The post puller 10 can be configured to grip onto one or more of the three flanges F of such a post (i.e. on one or more of the stem/stalk or wing flanges of such posts).

In the manually operated post puller apparatus shown in the drawings, each jaw 12 is pivotally mounted adjacent to an in-use proximal end thereof on a jaw support plate 18 via bolt 19 and bearings 20 (Figure 1A). Each jaw 12 can pivot with respect to the plate between the open and gripping positions.

The jaw support plate 18 is fixedly mounted (e.g. welded) to square tubular sleeve 22 to be slidably movable on, up and down, a square tubular support post 24 during actuation of the post puller. The support post 24 extends up from a generally flat base plate 26 adapted for location on the ground adjacent to the post to be pulled/lifted. The base plate has upturned sides 27 to facilitate its traverse across the ground into position adjacent to a post to be pulled.

The post puller 10 further comprises an elongate lever-like handle 28 (e.g. of steel tube). The handle 28 is pivotally mounted, intermediate its ends, to an in-use upper end of the support post 24 via opposing fork brackets 30 extending from a distal end 31 of the handle and affixed thereto. The fork brackets 30 are pivotally mounted to the upper end of the support post 24 intermediate their ends, via a pivot pin 32.

It will be seen that each fork bracket 30 includes an intermediate bend. This helps with positioning of the post flange F between the opposing distal ends of the fork bracket 30 (see Figure 4).

A free end 33 of each fork bracket 30 is pivotally coupled to a respective upper end of a linkage arm 34 via a respective pin 36. A lower (opposite) end of each linkage arm is pivotally coupled via a pin 38 to a respective jaw 12 at or adjacent to a distal end of each jaw (i.e. spaced from where the in-use proximal end of the jaw is mounted to the jaw support). The linkage arms 34 are each provided with an intermediate twist 40

to increase their strength/rigidity. During actuation of the post puller 10 this coupling causes each jaw 12 to pivot with respect to the jaw support plate 18 at the bearings 20.

Example of Operation

5 Manual actuation of the post puller 10 comprises the following steps:

1. Lifting up a proximal end 42 of the handle 28. This causes the handle 28 to pivot around the upper end of support post 24 at pin 32, whereby the fork free ends 33 move downwardly. This in turn urges the linkage arms 34 down so as to act on the jaws 12 at pins 38, causing the proximal end of each jaw to pivot up (i.e. around the bearing 10 20). This widens the spacing between each jaw, whereby the jaws move into their open position.

2. Locating a flange F of the post between the open jaws 12 (see Figure 4). In this case, usually the post P comprises one or more elongate flanges F (e.g. a three-flanged Y-post or T-post). The post puller 10 is positioned at the post (i.e. by shifting 15 the base plate 26 across the ground) so that a distal edge of one of the flanges is able to be located between the open jaws 12.

3. Lowering the proximal end 42 of the handle 28. Again, this causes the handle to pivot around the upper end of support post 24 at pin 32, but now the fork free ends 33 move upwardly. This in turn urges the linkage arms 34 up, this time acting on the jaws 20 12 at pins 38 to cause the proximal end of each jaw to pivot down (i.e. around the bearing 20). This closes the spacing between each jaw, moving the jaws into a position where the curved surfaces 14 start to engage and roll around the opposing post flange sides, until the ball detent 16 starts to engage and grip on those sides.

4. The post puller 10 is now ready for post dislodgement from the earth. In this 25 regard, the proximal end 42 of the handle 28 is now forced/urged even lower. This causes the jaws 12, at the ball detents 16, to grip hard against (lock onto) the opposing post flange sides. Thus, the jaws are now locked against further pivoting and, as the distal end 31 of the handle 28 continues to lift, the linkage arms 34 must now slidingly draw up the sleeve 22, together with the jaw support plate 18, along the support post 24. 30 Thus, removal of the post from the earth commences.

The post puller 10 can have enough leverage to fully remove the post, or the post may be lifted and dislodged from the earth just sufficiently enough for a final manual (hand) removal.

5 It is observed that the post puller configuration results in less post damage (including post bending) when, for example, the post to be removed is solidly rooted in the ground. The configuration and action of the jaws 12 is such as to pull the post straight up out of the ground. Further, any surface damage at the point of jaw contact is minimal. For posts that are solidly stuck, the base plate can be urged against the ground during use whilst the post puller can be used to lever the post out.

10 The removed post may be reused, or optionally repaired (e.g. painted, reshaped) and reused, or it may be discarded.

Various of the post puller components can be formed from steel and steel alloys (or other strong metal, such as aluminium), with contact surfaces (e.g. of the jaws, detent, etc) being formed from hardened/toughened steel alloys.

15 The curved surface 14 may even carry e.g. a vulcanised rubber at its surface to further minimise post surface scratching, or cracking/abrasion of a coating on the post surface.

20 Whilst a number of specific post lifter embodiments have been described, it should be appreciated that the post lifter may be embodied in many other forms.

For example, whilst conceivably just one jaw can comprise the surface with the detent, typically each jaw comprises the surface with the detent. Thus each jaw can engage against a respective side of the post flange.

25 If just one jaw comprises the surface with the detent, the other jaw may be fixed or movable. However, typically each jaw is movable between the open and gripping positions. This results in a symmetry of both the gripping and lifting forces in use of the post puller.

30 When the post is other than e.g. one that comprises one or more elongate flanges, the jaws can be reconfigured and reshaped. For example, if the post is tubular or cylindrical, the jaws can be shaped and spaced to receive the cross-section therein. In this regard, the jaws can be thickened, and the detent 16 may be enlarged or even

adapted to the external surface of the tubular or cylindrical post. The curvature of surface 14 may also be changed.

5 In the claims which follow, and in the preceding description, except where the context requires otherwise due to express language or necessary implication, the word “comprise” and variations such as “comprises” or “comprising” are used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the post lifter as disclosed herein.

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CLAIMS

1. A post lifter for assisting with removal of a post from earth, the post lifter comprising opposing jaws, at least one of the jaws being movable between an open position in which a space is defined between the jaws to receive therein a portion of the post, and a
5 gripping position in which the jaws have moved closer together to grip onto the post portion and such that actuation of the post lifter causes the post to commence lifting out of the earth,
wherein a surface of at least one of the jaws comprises a ball detent for engagement against the post portion when the at least one jaw is in the gripping
10 position.
2. A post lifter as claimed in claim 1 wherein the ball detent is spring-loaded and is partially recessed into the surface of the at least one jaw.
- 15 3. A post lifter as claimed in any one of the preceding claims wherein the surface comprising the ball detent is curved, with the curved surface engaging against the post portion during movement between the open and gripping positions and during actuation of the post lifter.
- 20 4. A post lifter as claimed in any one of the preceding claims wherein each jaw comprises the surface with the ball detent for engagement against a respective side of the post portion.
5. A post lifter as claimed in any one of the preceding claims wherein each jaw is
25 movable between the open and gripping positions.
6. A post lifter as claimed in any one of the preceding claims configured to remove a post comprising at least one elongate flange extending for at least part of its length, with the flange defining the post portion, and wherein the jaws are spaced such that, when in
30 the open position, the jaws can receive the at least one flange therebetween and, when

in the gripping position, the jaws and ball detent(s) can engage with and grip against a respective side of the at least one flange.

5 7. A post lifter as claimed in any one of the preceding claims wherein each jaw is pivotally mounted on a jaw support to pivot between the open and gripping positions.

8. A post lifter as claimed in claim 7 wherein the jaw support is movable up and down with respect to and along a frame of the post lifter.

10 9. A post lifter as claimed in claim 8 wherein the frame comprises a base for location on the earth, and a support post extending up from the base, and wherein the jaw support is mounted to a sleeve that is locatable on, for sliding up and down, the support post during actuation of the post lifter.

15 10. A post lifter as claimed in claim 9 wherein a handle is pivotally mounted, intermediate its ends, to an in-use upper end of the support post, and wherein a distal end of the handle comprises two linkage arms coupled thereto, with a remote end of each linkage arm being coupled to a respective jaw so as to cause it to pivot on the jaw support during actuation of the post lifter.

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11. A method of actuating the post lifter as claimed in claim 10, the method comprising the steps:

- lifting a proximal end of the handle so as to move the jaws into the open position;

- locating the post portion between the jaws;

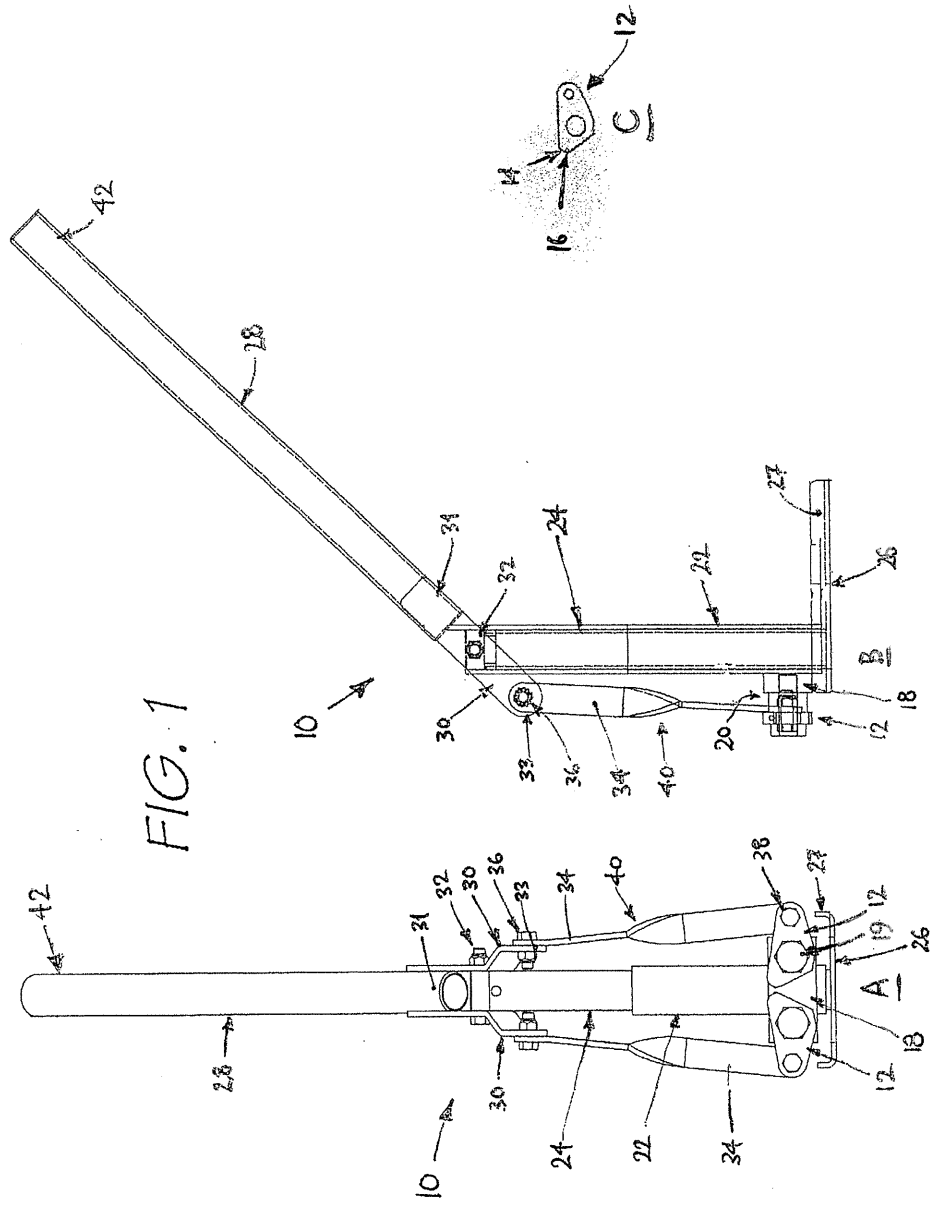
25 - lowering the proximal end of the handle until the jaws move into the gripping position whereby the at least one detent is able to engage against the post portion.

12. A method as claimed in claim 11 comprising the further step of:

- urging the proximal end of the handle lower whereby the jaws grip hard against the

30 post portion, thereby causing the distal end of the handle and the linkage arms to draw

the sleeve slidingly up on the support post, whereby removal of the post from the earth commences.



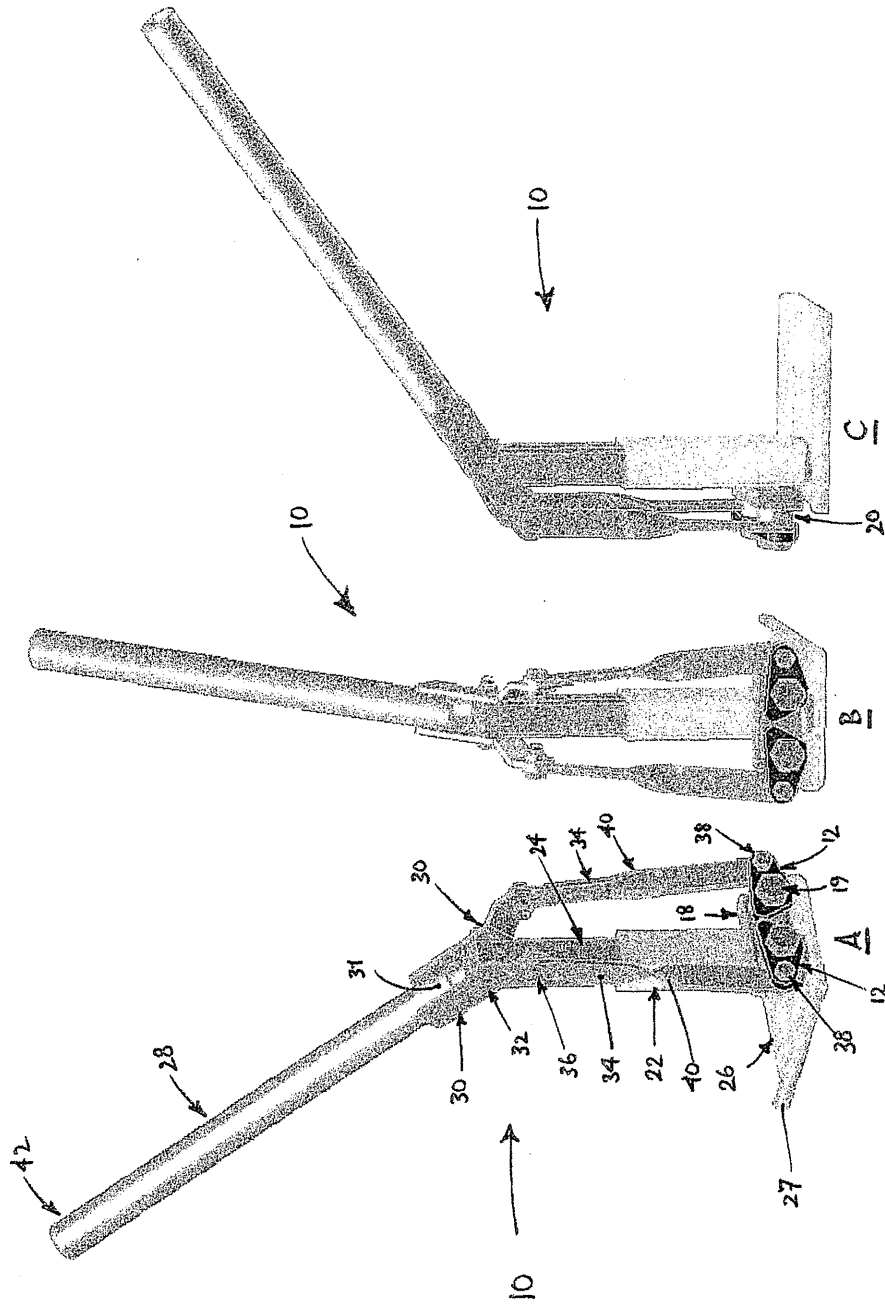
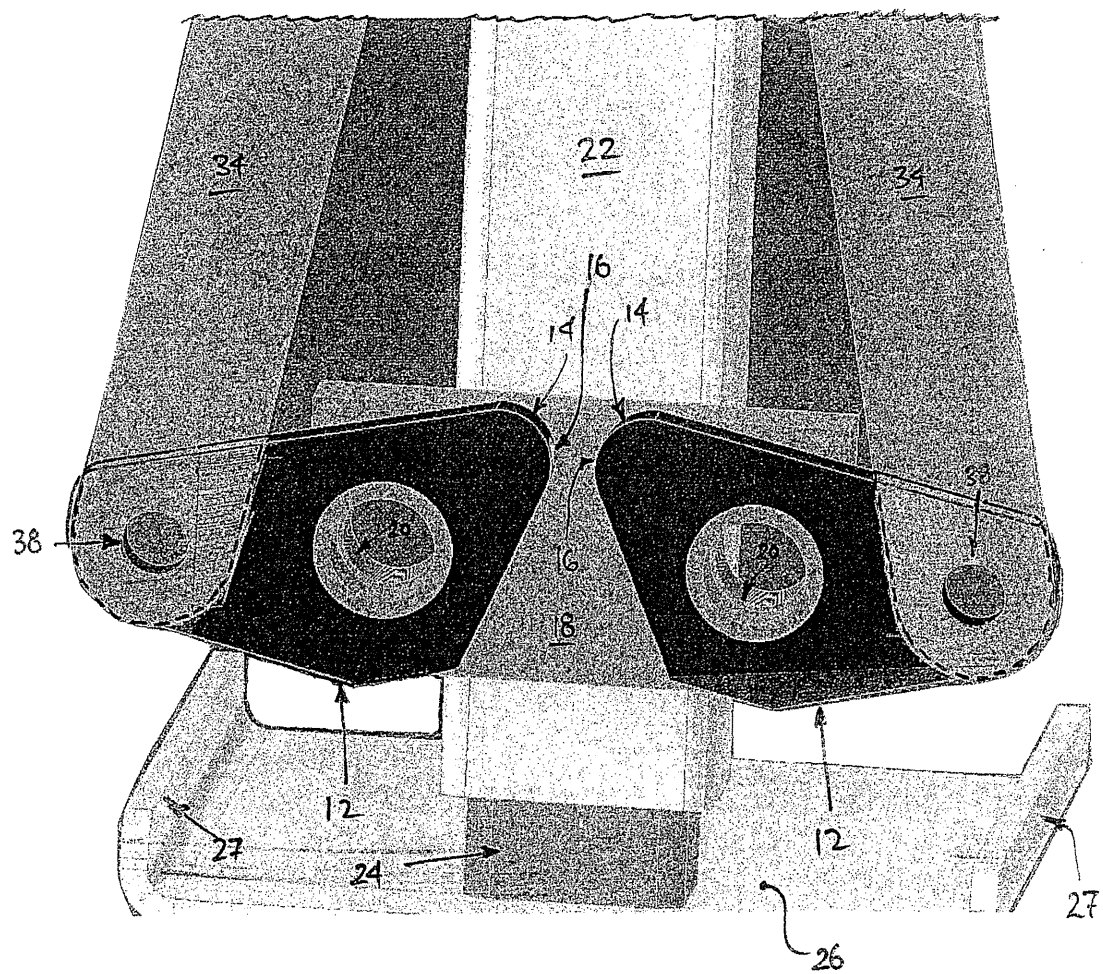


FIG. 3



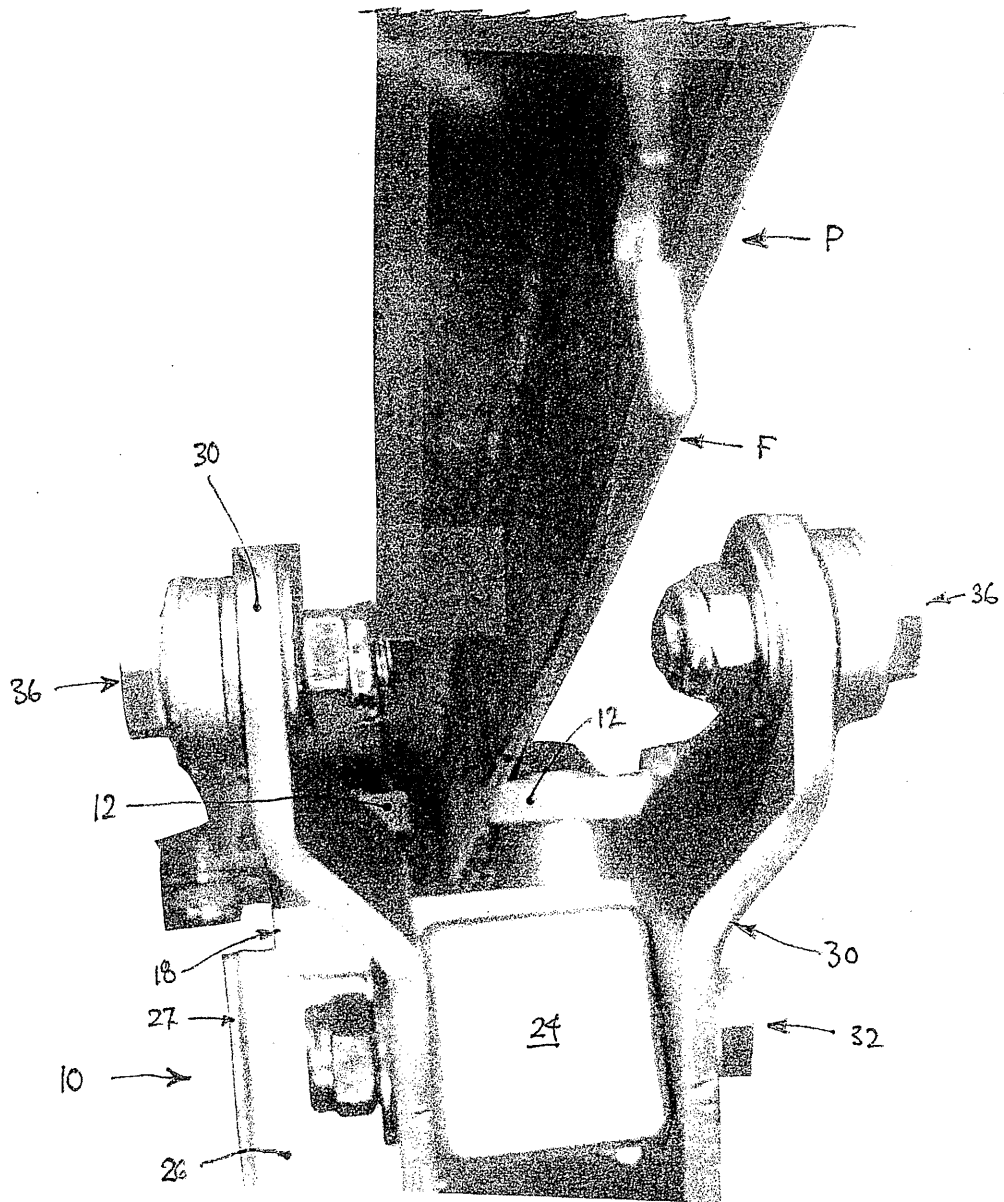


FIG. 4