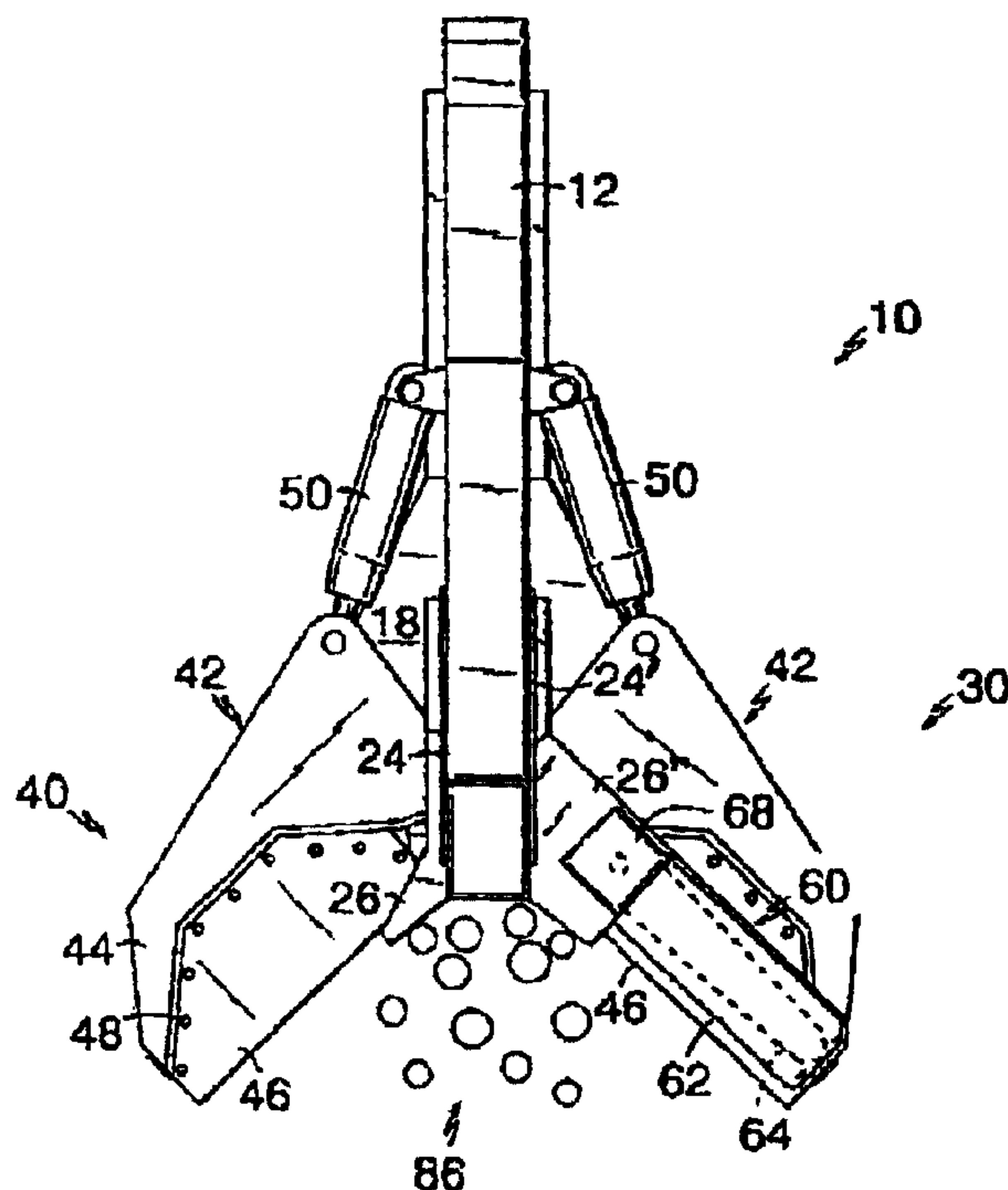




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(54) Title: WOOD HARVESTER



(57) **Abrégé/Abstract:**

The invention relates to a wood harvester which includes a cutting unit. With the intention of providing a cutting unit which can selectively effect a cutting operation either by sawing or by shearing, it is proposed in accordance with the invention, among other things, that the cutting unit includes a pair of shearing elements (42, 42), of which one can be driven relative to the other in a first plane between an open position and a shearing terminal position, and also a saw means (64) which can be driven in a second plane generally parallel with the first plane between a rest position and a saw terminal position, wherein the saw means (64) when in its rest position is located so close to one of the shearing elements (42) that in the open position the clipping element will form a bottom guard for the saw means (64) before operating the saw means (64) or the shearing elements (42, 42).





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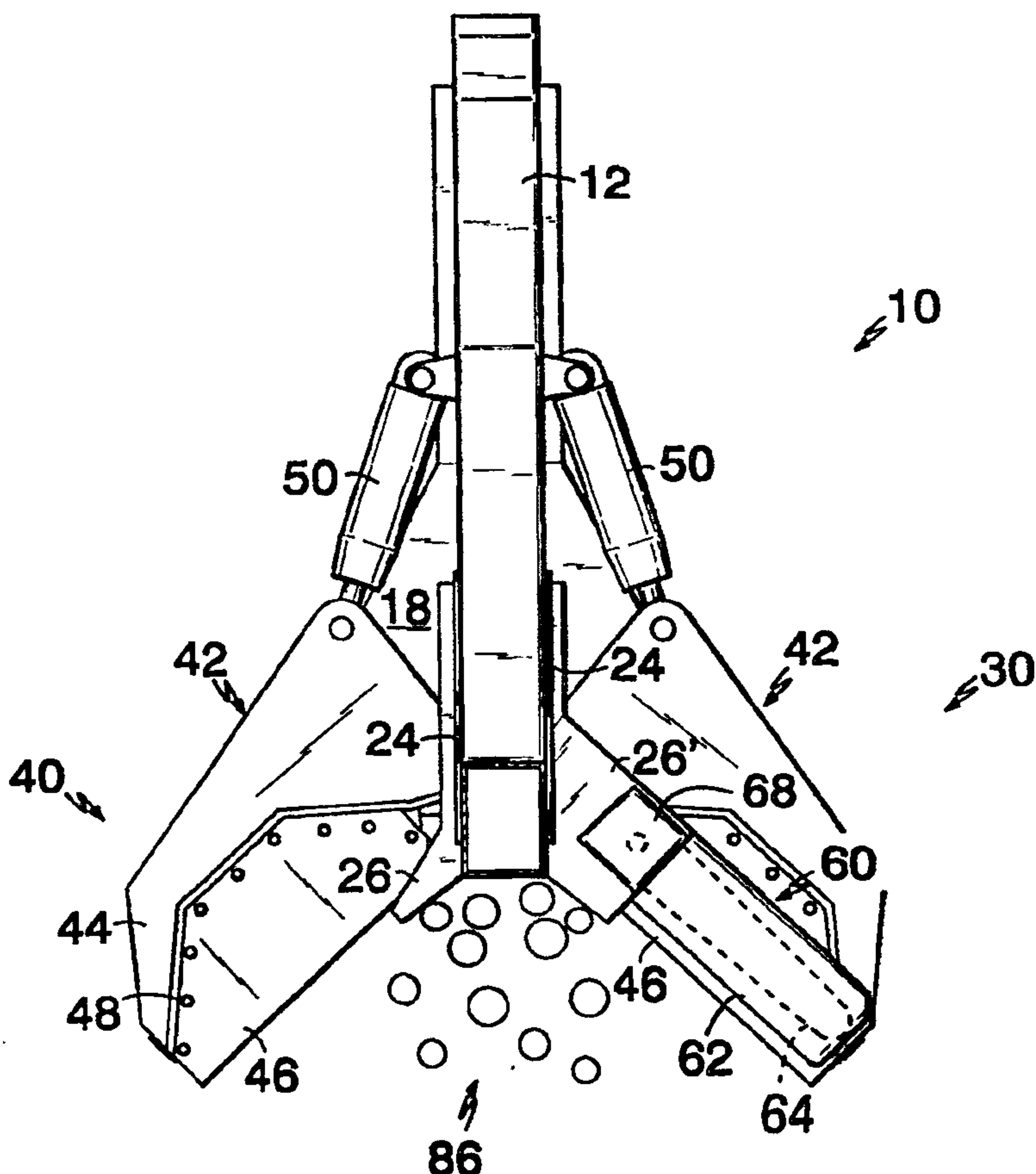
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(54) Title: WOOD HARVESTER

(57) Abstract

The invention relates to a wood harvester which includes a cutting unit. With the intention of providing a cutting unit which can selectively effect a cutting operation either by sawing or by shearing, it is proposed in accordance with the invention, among other things, that the cutting unit includes a pair of shearing elements (42, 42), of which one can be driven relative to the other in a first plane between an open position and a shearing terminal position, and also a saw means (64) which can be driven in a second plane generally parallel with the first plane between a rest position and a saw terminal position, wherein the saw means (64) when in its rest position is located so close to one of the shearing elements (42) that in the open position the clipping element will form a bottom guard for the saw means (64) before operating the saw means (64) or the shearing elements (42, 42).



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WOOD HARVESTER

The present invention relates to a wood harvester which includes a cutting assembly.

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Two main methods are used in the forest industry to separate roots from tree trunks and for cutting tree trunks in general, namely sawing and shearing. Sawing is primarily required when logging large-diameter tree trunks intended for use in timber and pulp production, where high demands are placed on the quality of the cut surface, so as to avoid the formation of cracks and splinters that may impair the raw timber or pulp material. Shearing is primarily suited for application with trunks of smaller diameter in conjunction with forest cleaning-thinning work and energy-wood felling, and also when cutting or logging large-diameter tree trunks which have been damaged in some way or another and which are therewith rendered unsuitable as raw material for the manufacture of timber and pulp.

25

30

Although shearing can often be replaced with sawing, there are situations when the sawing tool - practically always a chain saw - is deficient in some way or another. This applies in particular when the sawing tool comes into contact with several slender, elastic trunks or branches, for instance when cutting the crowns of birch trees or the tops of spruces, which tend to seize, stop and possibly damage a saw chain.

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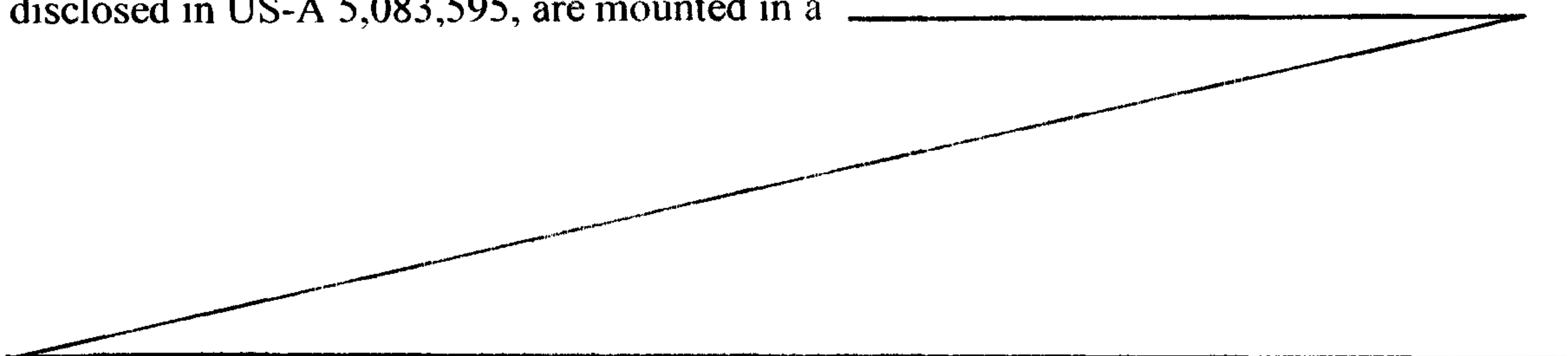
An object of the present invention is to provide a wood harvester of the aforescribed kind whose cutting unit is able to effect a cutting operation either by sawing or by shearing, therewith avoiding the aforesaid drawbacks and affording a greater degree of freedom.

This object is achieved with the characteristic features set forth in the following Claims.

In accordance with one aspect of the present invention there is provided a wood harvester including a cutting unit, having a pair of wood shearing elements of which at least one can be driven relative to the other in a first plane between an open position and a shearing terminal position, and also a saw means which can be driven
5 in a second plane which is generally parallel with the first plane, between a rest position and a saw terminal position, wherein the saw means when in said rest position is located so close to the shearing elements that said elements form a bottom guard for said saw means, at least in said open position, characterized in that the shearing elements include a cutting knife mounted in a knife frame, and in that the
10 upper sides of the cutting knife and the knife frame lie substantially in the same plane, and in that a portion of the knife frame supporting the underside of the cutting knife extends convergently at an acute angle towards the cutting knife in a knife cutting direction.

15 The invention will now be described in more detail with reference to an exemplifying embodiment thereof and also with reference to the accompanying drawings, in which FIGURE 1 is a top view of a bottom part of a wood harvester according to the invention; FIGURE 2 is a side view of the harvester illustrated in FIGURE 1; FIGURE 3 is a top view of a modified version of the harvester illustrated in FIGURE
20 1 and shows the harvester in a shearing terminal position; FIGURE 4 illustrates a modified version of the harvester illustrated in FIGURE 1 and shows the harvester in a saw terminal position; and FIGURE 5 is a schematic sectional view taken on the line 5-5 in FIGURE 4.

25 The inventive wood harvester 10, which is shown only partially in the drawings, is intended to be fitted to the crane arm of, an excavating machine or digger for instance, and include a bottom frame part 12, which in the illustrated embodiment extends at an angle from a vertical centre beam 20 on the harvester. It is assumed that a pair of gripping arms and optionally also a trunk-gathering device, for instance of the type
30 disclosed in US-A 5,083,595, are mounted in a



known manner on that part of the central beam 20 which is not shown in the drawing.

5 The illustrated harvester 10 is also constructed as a so-called tree plucker and is provided with a ground support 14 which is able to thrust against an underlying surface 80 and fell or cut a tree grasped by the gripping arms (not shown) through the agency of a lever-arm effect, by plucking the tree from the ground
10 with its root attached, which is another tree harvesting method. However, the invention can also be applied advantageously with wood harvesters that lack the provision of a ground support 14.

15 Mounted close to the bottom end of the frame part 12, in the vicinity of the ground support 14, is a cutting unit 30 which, in accordance with the invention, includes a shearing device 40 and a saw means in the form of a chain saw 60 mounted closely above the
20 shearing device.

The shearing device 40 includes a pair of shearing elements 42, 42, each of which comprises a relatively thick knife-frame 44 and a relatively thin shearing or
25 cutting wedge or knife 46, which is secured to the knife-frame 44 by means of screw joints 48. As will be seen from FIGS. 2 and 5, the upper sides of the knife-frame 44 and the cutting knife 46 lie essentially in mutually the same plane, so that the relatively thicker knife frame 44 projects down beyond the underside
30 of the cutting knife 46. In this way, which is the reverse to conventional shearing devices, the shearing device 40 obtains a generally flat upper side which enables the chain saw 60 to be placed very close to
35 the shearing device 40 and therewith protected by said device from beneath, and also enables the upper side of the shearing device to serve as a flat supportive surface for several trunks when using the aforesaid trunk gathering function. As indicated in FIG. 2, the

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"reversed" positioning of the knife frame 44 of the shearing device 40 will not, in practice, present an obstacle to cuts that are made close to the root of the tree, since the ground part 84 which embraces the root-end of the tree 82 to be felled will normally slope downwardly and outwardly from the tree and thereby leave space for the downwardly projecting knife-frame 44, even when cutting the tree close to its root. In order to ensure that the downwardly extending parts of the knife-frame 44 will not prevent the shearing elements 42, 42 from closing, for instance by coming into contact with the edges of upwardly turned cutting surfaces on the tree, those sides 43 (only one of which is shown in FIG. 5) of the knife frame 44 that border on the cutting knife 46 converge at an acute angle towards the cutting knife 46 in its cutting direction, so that they can slide more easily past such edges.

Each of the two shearing elements 42, 42 are pivotally journalled on a respective journal shaft 22 (only one of which is shown in FIG. 2), the upper end of which is connected to a tree-capturing plate 26 (see also FIG. 1), which in turn is connected to the frame part 12 via a reinforcing plate 24, and the bottom end of which is connected to a bottom plate 18 on the ground support 14, via a bearing attachment 28. The bottom plate 18 forms a large abutment surface against the underlying support, and also provides protection for the hydraulic piston-cylinder devices 50, 50 against irregularities in the underlying support surface 80.

The two shearing elements 42, 42 are driven for pivotal movement about their respective journal shafts 22 between an open position (FIG. 1) and a shearing terminal position (FIG. 3) by a respective hydraulic piston-cylinder device 50, for instance for severing a bouquet of a plurality of more slender tree trunks or stems 86. One end of respective hydraulic devices 50

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is pivotally journalled on one outer surface of the ground support 14 while the end of the piston rod of each hydraulic device is pivotally journalled to a rear, outer corner of respective shearing elements 42.

5 In addition to severing slender stems, the shearing device is better suited than a chain saw for cutting large-diameter untrimmed trunks, the branches of which are liable to guide a saw-guide bar away from the intended cutting plane, with possible damage to the
10 chain saw as a result.

The chain saw 60 may be comprised of a known saw unit, having a saw-guide bar 64 which for cutting, e.g., a tree trunk 82 is constructed so as to be swung out and
15 in between a rest position (FIGS. 1, 3) and a saw terminal position (FIG. 4) in a saw guard, such as a saw box 62.

As illustrated in FIGS. 4 and 5, instead of a saw box,
20 the saw-guide bar 64 may be covered in its rest position by a cover means having the form of a spring-steel blade 62', adjacent the contours of which there is provided one or more support or abutment devices 63 which face towards the shearing element. In the illus-
25 trated embodiment, the abutment devices 63 are formed integrally with the steel blade 62' in the form of angled flaps, although they may also extend in the form of a single rim along the rear and outer side (not shown) of the blade 62'. The undersurfaces of the
30 abutment devices 63 are spaced from the upper side of the shearing element 42, so that when the upper side of the steel blade 62' is subjected to blows and impacts, it will perform a resilient or damping move-
35 ment before the abutment devices 63 strike the upper surface of the shearing element 42, and therewith prevent the blade 62' from coming into contact with the saw-guide bar 64 and the saw chain (not shown).

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5 The guide bar attachment 66 of the guide bar 64 is
pivotaly mounted on the underside of an opposing
wood-catching plate 24', which is larger than the
wood-capture plate 24 and to which the aforescribed
cover means 62' is attached. The saw chain (not shown)
of the saw-guide bar 64 is driven by a hydraulic motor
68 mounted on the upper side of the plate 24'. Pivotal
movement of the saw-guide bar 64 between the rest
position and the saw terminal position is effected by
10 means of a setting device 70, e.g. a hydraulic piston-
cylinder device, mounted between the guide bar attach-
ment 66 and the plate 24'.

15 Because the sawing movement of the saw-guide bar 64 is
effected by a pivotal movement from outside and in
towards the wood harvester, as illustrated in FIG. 4,
the tree can be held by the gripping arms (not shown)
of the harvester during the root separating sawing
action, and thereby be subjected to a force that acts
20 towards the harvester without risk of the guide bar
and saw chain being clamped between the cut surfaces
during a cutting operation.

25 When in its rest position and at least when the shear-
ing device 40 is in its open position, the chain saw
60 with saw-guide bar 64 is protected by the underly-
ing shearing element 42 against contact with the
underlying support surface 80 and with stones and the
like protruding from said surface. As illustrated in
30 FIG. 3, the frame part 44 of said shearing element 42
may alternatively extend in the form of the sector of
a circle 44', so that the saw-guide bar 64 will be
protected even in the shearing terminal position.

35

What is claimed is:

1. A wood harvester including a cutting unit, having a pair of wood shearing elements of which at least one can be driven relative to the other in a first plane between an open position and a shearing terminal position, and also a saw means which can be driven in a second plane which is generally parallel with the first plane, between a rest position and a saw terminal position, wherein the saw means when in said rest position is located so close to the shearing elements that said elements form a bottom guard for said saw means, at least in said open position, characterized in that the shearing elements include a cutting knife mounted in a knife frame, and in that the upper sides of the cutting knife and the knife frame lie substantially in the same plane, and in that a portion of the knife frame supporting the underside of the cutting knife extends convergingly at an acute angle towards the cutting knife in a knife cutting direction.
2. A wood harvester according to Claim 1, characterized in that the saw means includes a saw-guide bar of a chain saw.
3. A wood harvester according to any of the preceding Claims, characterized by a saw-means cover plate which is spaced by a distance above the saw means.
4. A wood harvester according to Claim 3, characterized in that the cover plate is made of spring steel.
5. A wood harvester according to Claim 3 or 4, characterized by support means which are disposed adjacent the contours of the cover plate and face towards one of the shearing elements, the height of said support means being smaller than said distance.

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FIG.1

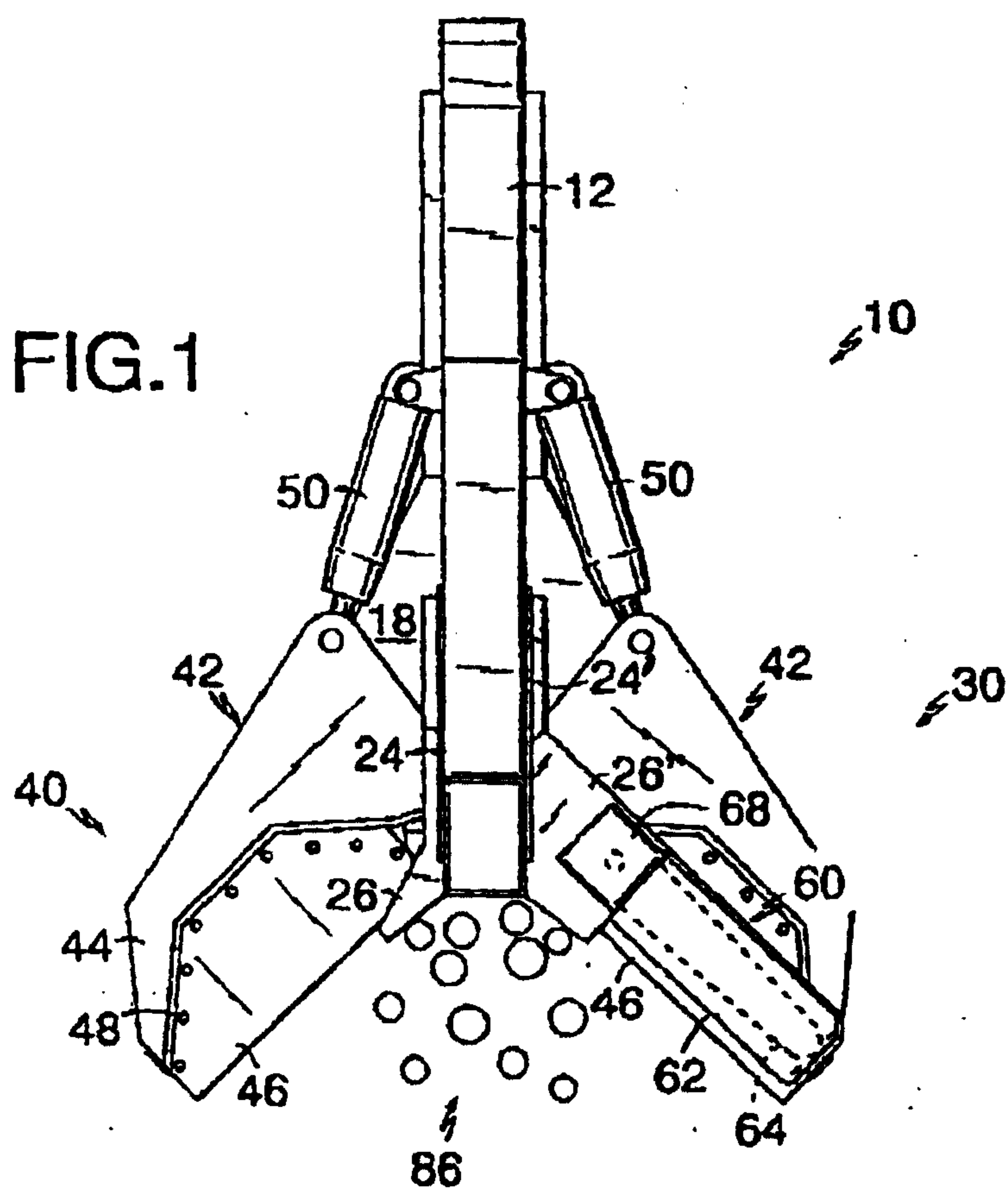
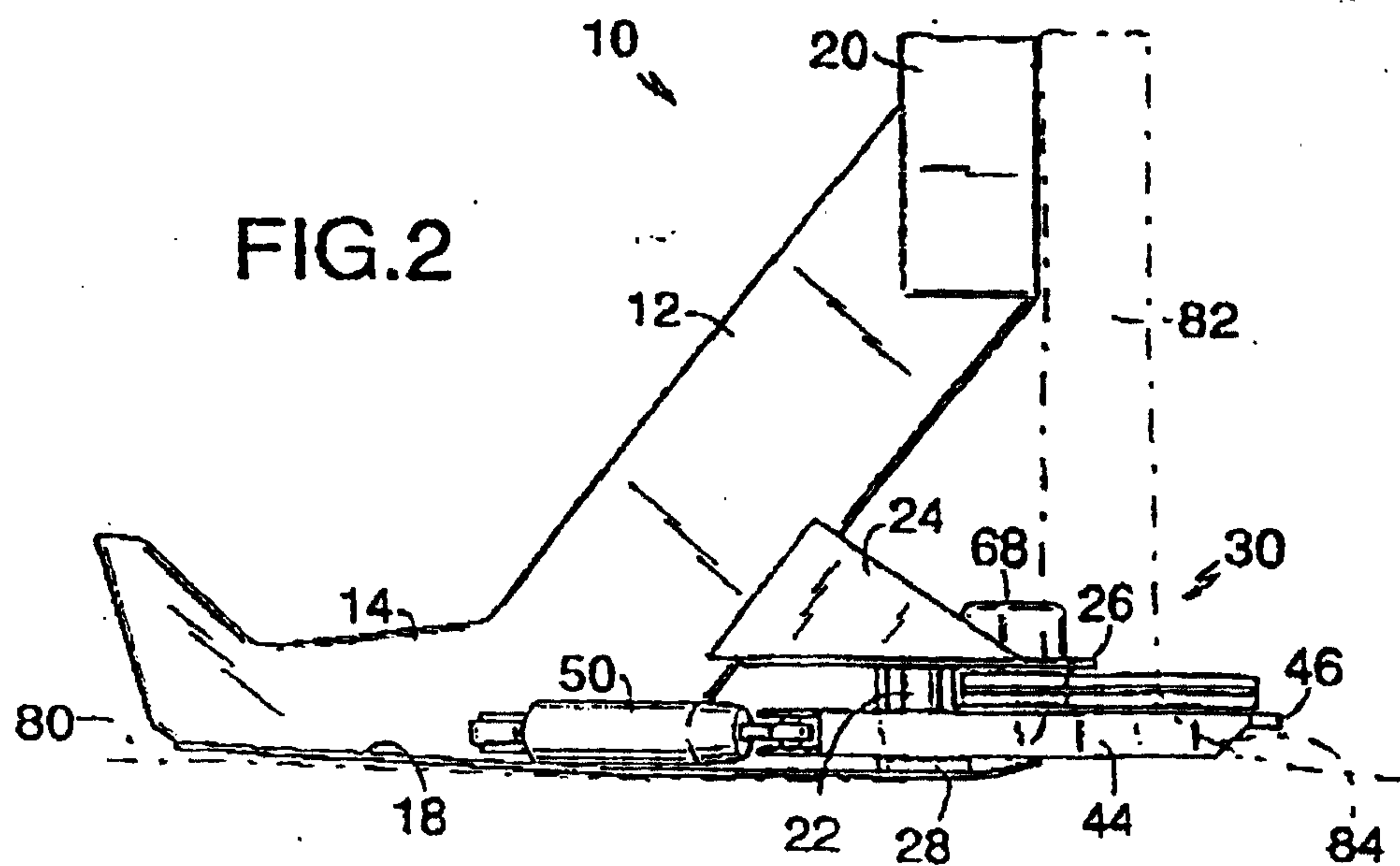


FIG.2



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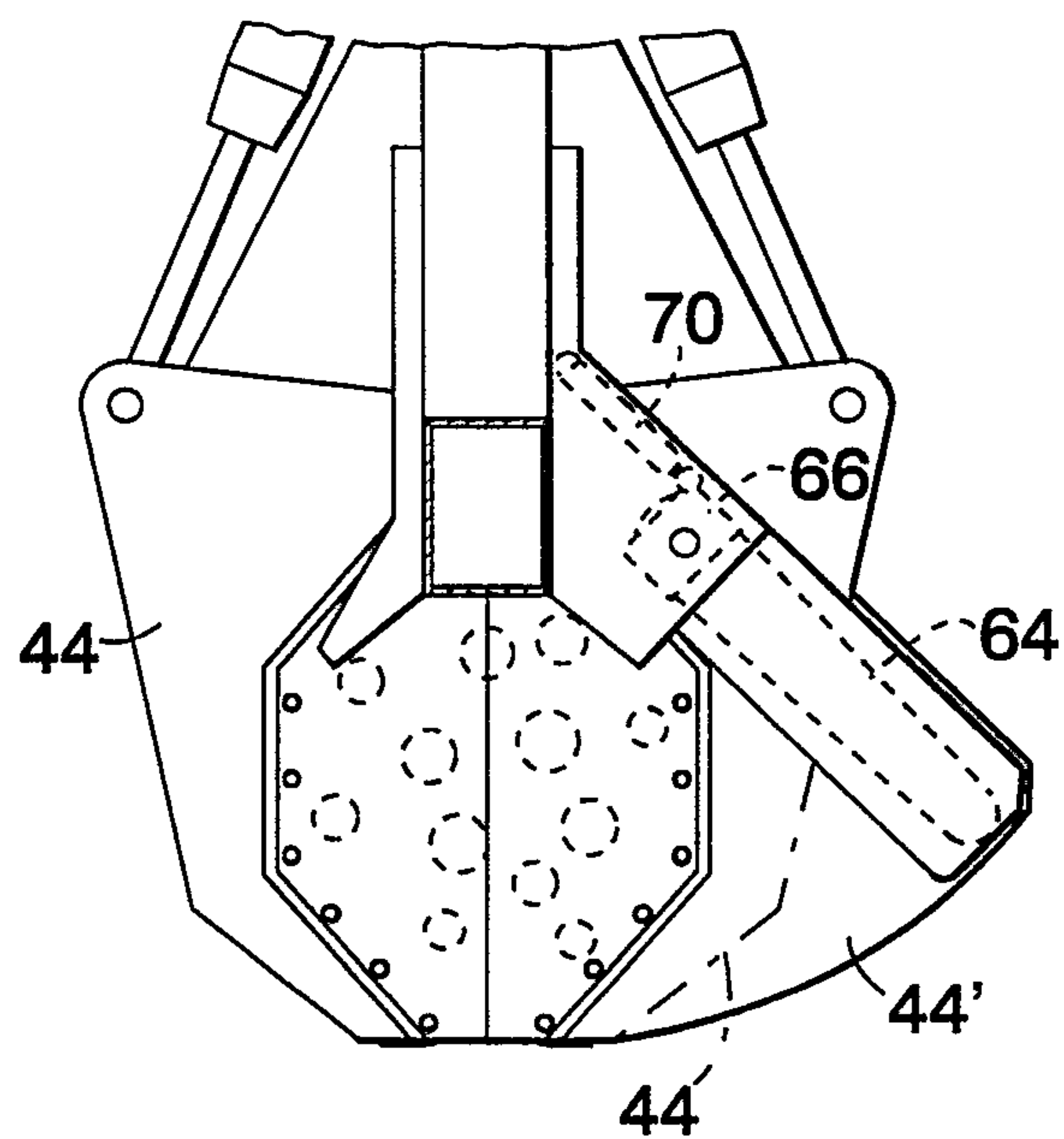


FIG. 3

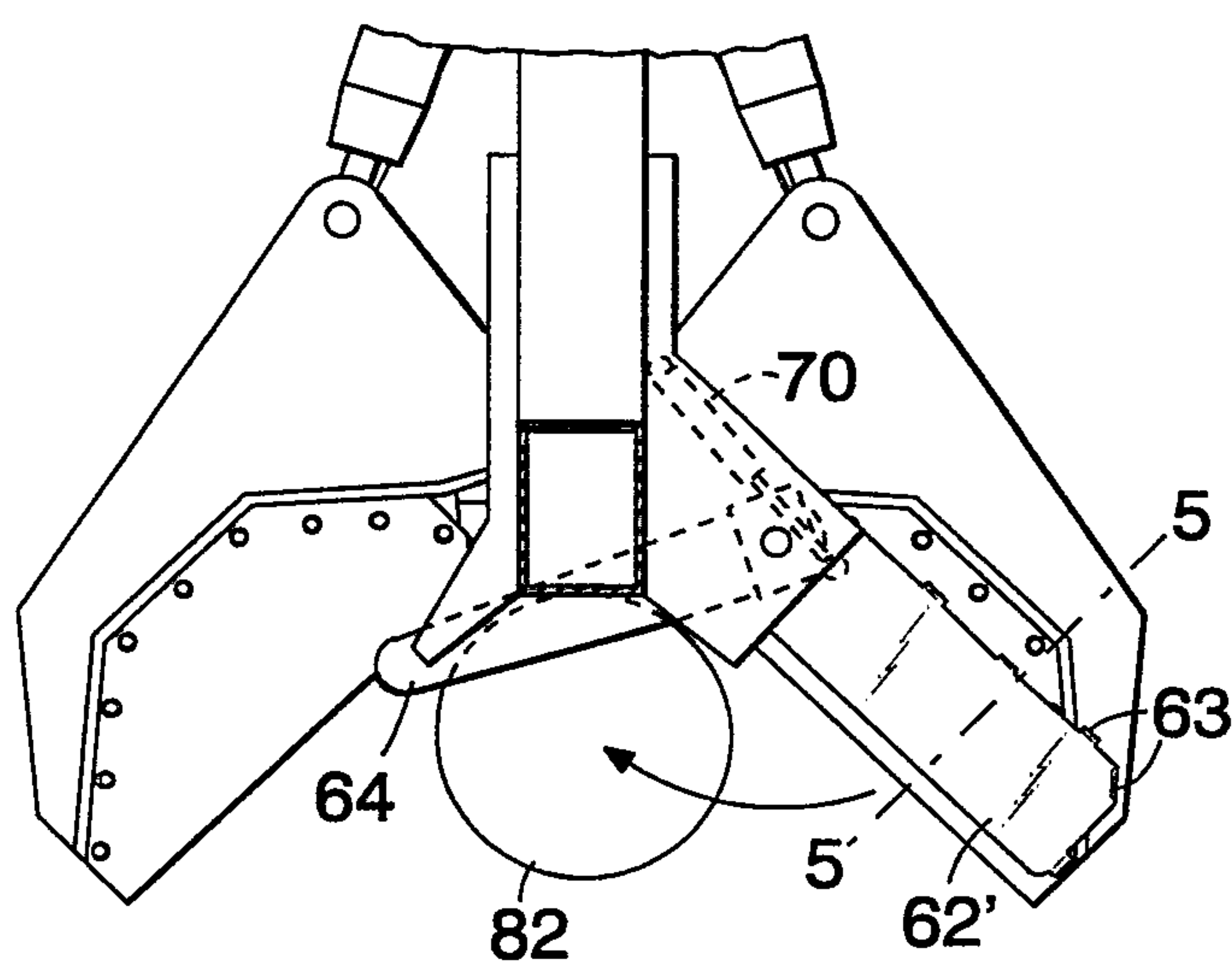


FIG. 4

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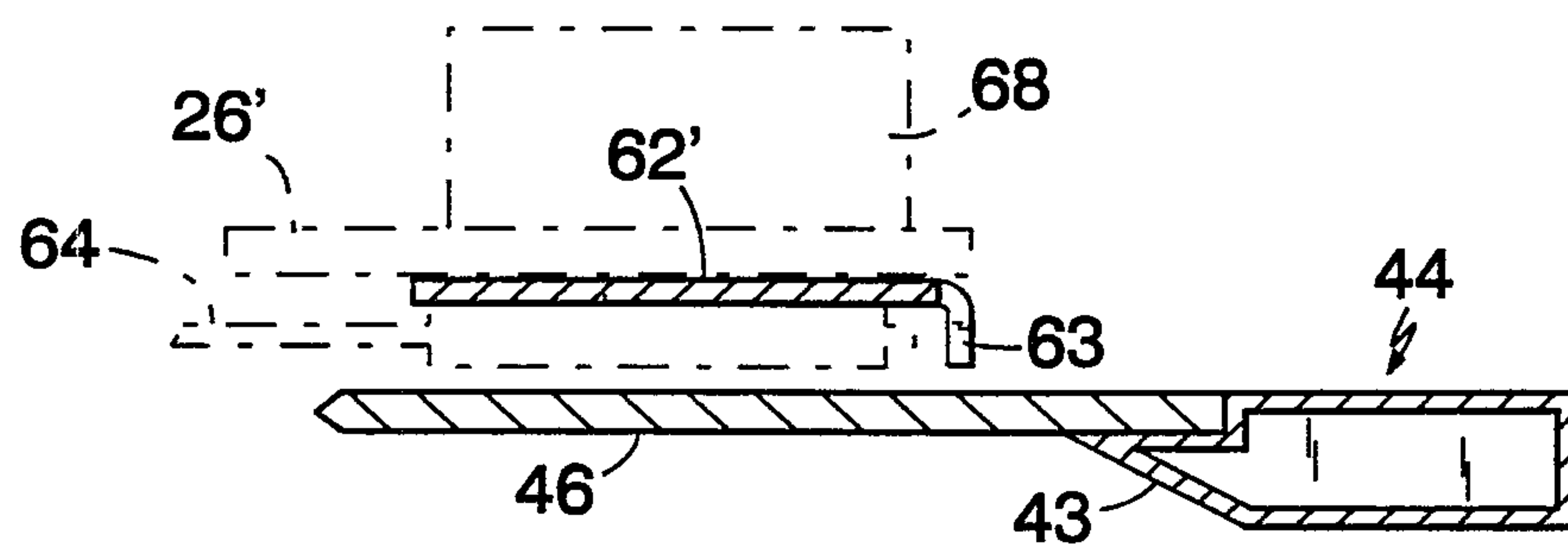


FIG.5

