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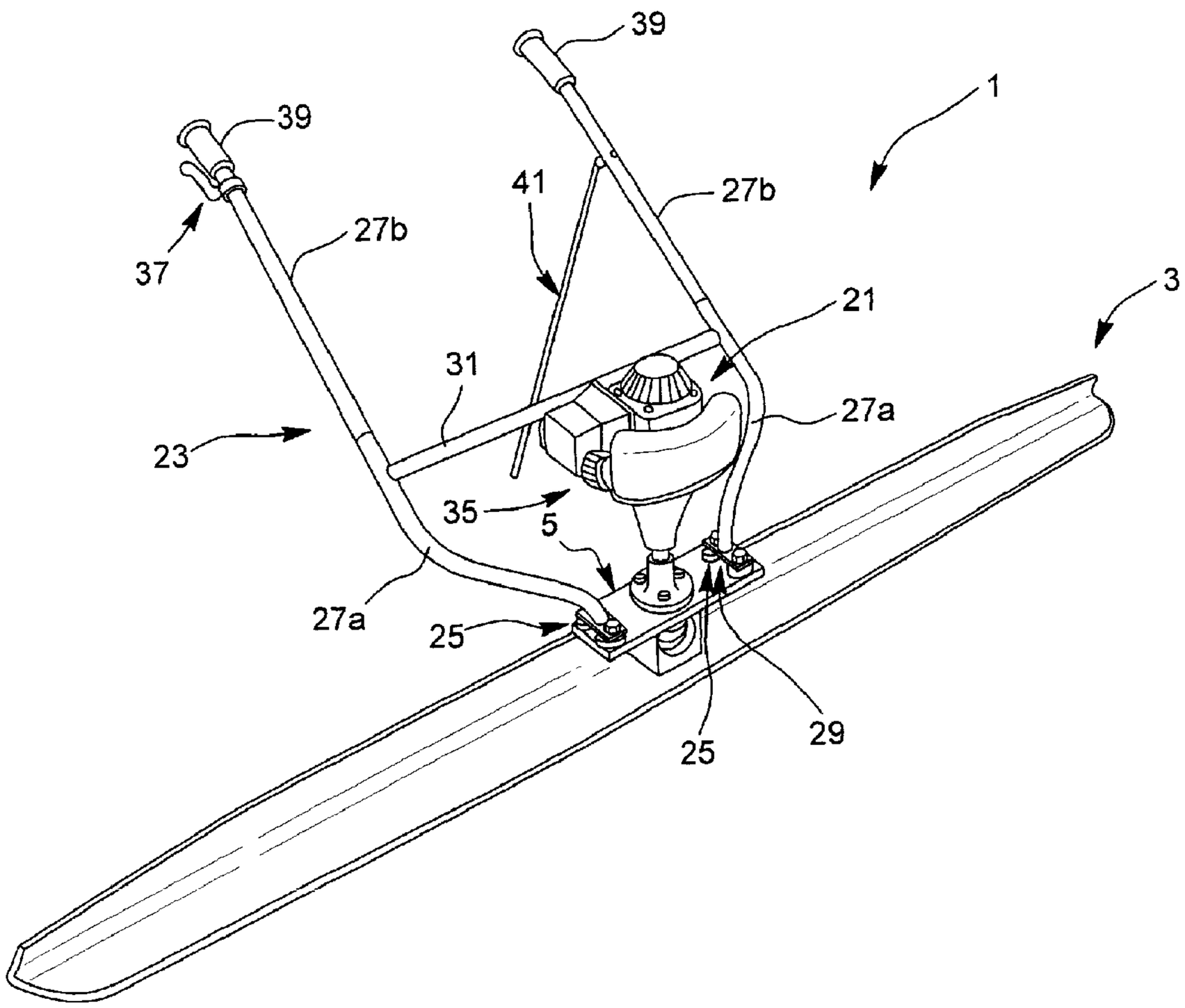
(54) Title: LEVELING BLADE, VIBRATING SCREED INCLUDING THE BLADE, AND KIT FOR ASSEMBLING THE SAME



(57) Abrégé/Abstract:
A leveling blade for mounting onto a support bracket of a vibrating screed, and a vibrating screed including the same. The leveling blade has a substantially vertical portion for mounting onto the support bracket, as well as a substantially slanted portion and a

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(57) Abrégé(suite)/Abstract(continued):
substantially horizontal portion, which results in the leveling blade having a particular profile. The vibrating screed includes also a vibration-generating assembly, being operatively mounted onto the support bracket of the vibrating screed for imparting vibrations to the leveling blade via the support bracket so as to enable to carry out a surfacing of a substantially malleable material with the vibrating screed by passing said leveling blade provided with vibrations about said substantially malleable material. A kit is also provided for assembling such a vibrating screed.

ABSTRACT

A leveling blade for mounting onto a support bracket of a vibrating screed, and a vibrating screed including the same. The leveling blade has a substantially vertical portion for mounting onto the support bracket, as well as a substantially slanted portion and a substantially horizontal portion, which results in the leveling blade having a particular profile. The vibrating screed includes also a vibration-generating assembly, being operatively mounted onto the support bracket of the vibrating screed for imparting vibrations to the leveling blade via the support bracket so as to enable to carry out a surfacing of a substantially malleable material with the vibrating screed by passing said leveling blade provided with vibrations about said substantially malleable material. A kit is also provided for assembling such a vibrating screed.

LEVELING BLADE, VIBRATING SCREED INCLUDING THE BLADE, AND KIT FOR ASSEMBLING THE SAME

Field of the invention:

The present invention relates to a leveling blade and to a vibrating screed provided with such a blade. More particularly, the present invention relates to a vibrating screed such as the ones used for surfacing concrete and other like materials, and also relates to a kit for assembling the same, as well as to a method of use or operation associated thereto.

Background of the invention:

Vibrating screeds are very well known in the art. Indeed, they are generally used for leveling off a horizontal surface such as a floor, typically made of a malleable material, such as concrete and the like, prior to the hardening thereof. Figure 1 of US patent No. 6,296,467 B1 shows an example of a conventional vibrating screed. As can be easily understood from this figure, a blade is passed over the surface to be leveled off, a motor being used for transmitting a vibratory movement to the blade, and the apparatus being provided with suitable handle bars in order to operate the screed, with control means used for controlling the extent of vibratory movement to be transmitted from the motor to the leveling blade.

Also known to the Applicant are the following US patents and patent application which describe similar and/or other related devices: 3,067,656; 4,340,351; 4,650,366; 4,798,494; 4,832,525; 4,838,730; 5,375,942; 5,857,803; 5,984,571; 6,089,787; 6,139,217; 6,200,065 B1; 6,223,495 B1; 6,231,331 B1; 6,267,532 B1; 6,322,286 B1; 6,374,569 B1; 6,705,799 B2; and 2005/0069385 A1.

It is also known in the art that a substantial drawback associated with these types of conventional vibrating screeds is that the profile of the blades used is not optimal (very often, they have a "segmented" profile), which results in an undesirable rearwardly accumulation of material behind the blade as it is passed over the material to be leveled. Moreover, very often, the vibratory movement which is transmitted to the blade is also transmitted to the handles of the apparatus, and thus onto the hands of the user, which is undesirable for obvious reasons. Moreover, it can be seen that the handle bars of such a conventional vibrating screed take up a lot of space, which is disadvantageous for storing purposes, and/or cannot be easily adjusted to allow a more ergonomic use of the vibrating screed for each individual user that may present different physical features or capabilities. Therefore, it would be useful to provide an improved vibrating screed which would have components easily adjustable so as to be better configured for a given user. Moreover, another substantial drawback associated with vibrating screeds of the prior art is that the general design is such that the components thereof may not be easily interchanged in the event of maintenance and/or repair.

Hence, in light of the above-discussed, there is a need for an improved vibrating screed which would be able to overcome some of the aforementioned prior art problems and drawbacks.

Summary of the invention:

The object of the present invention is to provide a leveling blade or a vibrating screed which, by virtue of its design and components, satisfies some of the above-mentioned needs, and which is thus an improvement over other related leveling blades or vibrating screeds known in the prior art.

In accordance with the present invention, the above object is achieved, as will be easily understood, with a leveling blade or a vibrating screed such as the

ones briefly described herein and such as the ones exemplified in the accompanying drawings.

According to the present invention, there is provided a leveling blade for mounting onto a support bracket of a vibrating screed, the leveling blade comprising:

a substantially vertical portion for removably mounting onto the support bracket of the vibrating screed, said substantially vertical portion having front and rear sides, and first and second ends;

a substantially slanted portion extending rearwardly from the second end of the substantially vertical portion, said substantially slanted portion having inner and outer sides, and first and second ends; and

a substantially horizontal portion extending frontwardly from the second end of the substantially slanted portion, said substantially horizontal portion having top and bottom sides, and first and second ends.

Indeed, according to an important aspect of the present invention, the leveling blade has a particular profile so as to overcome various disadvantages associated with the conventional leveling blades of vibrating screeds of the prior art. Namely, and preferably, the outer side of the substantially slanted portion is at an angle of about 160° with respect to the rear side of the substantially vertical portion.

Preferably also, the ratio between the length of the rear side of the substantially vertical portion and the length of the bottom side of the substantially horizontal portion is about 0.4, while the ratio between the length of the rear side of the substantially vertical portion and the length of the substantially slanted portion is about 1.26, and the top side of the substantially horizontal portion preferably tapers off frontwardly with respect to the bottom side thereof at an angle of about two (2) degrees.

Preferably also, transitions between adjacent portions of the leveling blade and the second end of the substantially horizontal portion thereof are substantially rounded off, for allowing namely, but not limitedly, a smoother surfacing of a malleable material (concrete, etc.) with the leveling blade, so as to overcome undesirable accumulations and/or streaks known to occur with conventional leveling blades.

According to another aspect of the present invention, there is also provided a vibrating screed for leveling a surface of a substantially malleable material, the vibrating screed comprising:

a support bracket;

a leveling blade mounted on the support bracket;

a vibration-generating assembly, the vibration-generating assembly being operatively mounted onto the support bracket for imparting vibrations to the leveling blade via the support bracket; and

a handling assembly, operatively connected to the support bracket via at least one vibration-damping joint, for handling the vibrating screed, the handling assembly comprising a pair of handle bars, each handle bar having an end being operatively connected to the support bracket via at least one vibration-damping joint, the ends of the handle bars being each connected to a corresponding connecting plate, each connecting plate being operatively connected to the support bracket via at least one vibration-damping joint.

Preferably also, each vibration-damping joint comprises a sleeve made of an elastomeric material, and has an inner bore, each vibration-damping joint being connected between a given connecting plate and the support bracket via at least one corresponding fastener inserted into said inner bore and having an extremity

in abutment with an outer portion of either one of the given connecting plate and support bracket.

Preferably also, each connecting plate is substantially rectangular and each connecting plate is operatively connected to the support bracket via a pair of vibration-damping joints being mounted respectively onto corresponding opposite ends of each substantially rectangular connecting plate.

Preferably also, each handle bar comprises first and second sections operatively connected to one another, the second section being adjustably pivotable with respect to the first section.

Preferably also, the handling assembly comprises a cross-bar extending between the first sections of the handle bars.

Preferably also, the cross-bar comprises a recessed segment in a substantially middle portion of said cross-bar.

Preferably also, the second section of each handle bar is adjustably pivotable with respect to the first section thereof along a substantially vertical plane.

Preferably also, the second section of each handle bar is adjustably pivotable with respect to the first section thereof and against the cross-bar.

Preferably also, each handle bar comprises a third section operatively connected to the second section thereof, the third section being adjustably pivotable with respect to the second section along a substantially vertical plane.

Preferably also, the vibrating screed comprises a control system for controlling an extent of vibrations generated by the vibration-generating assembly,

and where an actuator linked to the control system for controlling the same is provided adjacent to a handle of at least one handle bar.

Preferably also, at least one handle bar is removably provided with a support leg for supporting the vibrating screed when not in use.

Preferably also, the vibration-generating assembly comprises a motor cooperating with a shaft, the shaft being drivable by the motor and having an extremity provided with an eccentric cam so as to impart vibrations when rotatably driven by the motor.

Preferably also, the vibrating screed comprises a control system for controlling an extent of vibrations generated by the vibration-generating assembly.

Preferably also, the support bracket is substantially L-shaped, having a substantially horizontal portion with top and bottom sides, and a substantially vertical portion with front and rear sides.

Preferably also, the shaft of the vibration-generating assembly is a one-piece shaft.

Preferably also, the substantially horizontal portion of the support bracket is provided with an orifice through which the shaft of the vibration-generating assembly extends.

Preferably also, the eccentric cam is removably mountable onto the extremity of the shaft, the eccentric cam comprising a bore for inserting into the extremity of the shaft, and a transversal hole for receiving a fastener for securing the cam onto the shaft.

Preferably also, the vibrating screed comprises at least one support bearing for supporting a portion of the shaft of the vibration-generating assembly, beneath

the substantially horizontal portion of the support bracket, each support bearing having a hole through which the shaft extends, and being removably connected to a given side of the support bracket.

Preferably also, each support bearing is provided with a pair of flanges removably mounted onto to the given side of the support bracket by means of fasteners.

Preferably also, the vibrating screed comprises a casing removably mounted to the given side of the support bracket and being shaped and sized for encasing each support bearing so as to protect the same.

Preferably also, the casing is provided with a hole on a front portion of said casing.

According to yet another aspect of the present invention, there is also provided a method for operating the above-mentioned leveling blade and/or vibrating screed.

According to yet another aspect of the present invention, there is also provided a kit for assembling the above-mentioned vibrating screed.

According to yet another aspect of the present invention, there is also provided a method for assembling components of the above-mentioned kit.

According to yet another aspect of the present invention, there is also provided a surface having been surfaced with the above-mentioned leveling blade and/or vibrating screed.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non-restrictive description of

preferred embodiments thereof, given for the purpose of exemplification only, with reference to the accompanying drawings.

Brief description of the drawings:

Figure 1 is a front perspective view of a vibrating screed according to a preferred embodiment of the present invention, the vibrating screed being shown with at least one handle bar thereof being provided with a support leg for supporting the vibrating screed when not employed by a user, as illustrated.

Figure 2 is a side elevational view of a leveling blade according to the preferred embodiment of the present invention.

Figure 3 is a front plan view of a vibrating screed according to another preferred embodiment of the present invention, the vibrating screed being shown with its handle bars in an operative configuration.

Figure 4 is another front plan view of what is shown in Figure 3, the handle bars of the vibrating screed being now shown in a retracted configuration, and the vibration-generating assembly being removed so as to better illustrate a recessed portion of a cross-bar according to a preferred embodiment of the present invention, the vibrating screed being also shown with a casing encasing the support bearings of the vibrating screed.

Figure 5 is a partial side view of some components of a vibrating screed according to another preferred embodiment of the present invention, some of the components thereof being shown in a sectional view.

Figure 6 is an exploded view of other components of the vibrating screed according to another preferred embodiment of the present invention, said exploded view better illustrating the support bracket, support bearings, casing and

eccentric cam of the vibrating screed according to this particular preferred embodiment.

Figure 7 is a top view of a support bearing mounted onto a support bracket of a vibrating screed according to a preferred embodiment of the present invention.

Figure 8 is a bottom view of an eccentric cam mounted onto a shaft of a vibration-generating assembly according to a preferred embodiment of the present invention, said shaft and the fastener used for securing the eccentric shaft thereon, as well as a portion of the cam, being shown in a sectional view.

Figure 9 is a side view of a vibration-generating assembly cooperating with a support bracket according to yet another preferred embodiment of the present invention, some of the components illustrated being shown in a sectional view.

Figure 10 is a partial view of an extremity of a handle bar according to a preferred embodiment of the present invention, said extremity being shown with a third section of the handle bar in a first configuration.

Figure 11 is another view of what is shown in Figure 10, the extremity being shown now with the third section of the handle bar in another adjusted configuration.

Detailed description of preferred embodiments of the invention:

In the following description, the same numerical references refer to similar elements. The embodiments, geometric configurations and dimensions shown in the figures and/or presented herein, are preferred and for exemplification purposes only.

Moreover, although the present invention was primarily designed for leveling surface of concrete and the like, prior to hardening thereof, it may be used with other types of screeds and objects, and in other fields, as apparent to a person skilled in the art. For this reason, expressions such as "concrete", "leveling", "surfacing", "floor", "vibrating", etc. used herein should not be taken as to limit the scope of the present invention and includes all other kinds of screeds, blades or items, and all other purposes, with which the present invention could be used and may be useful.

Moreover, in the context of the present invention, the expressions "screed", "blade", "device", "unit", "asembly", and any other equivalent expression and/or compound word thereof (e.g. "vibrating screed") known in the art will be used interchangeably. Furthermore, the same applies for any other mutually equivalent expressions, such as "surfacing" and "leveling", "rivets", "bolts" and "fasteners", "vibrations", "vibratory movement" and "pulses", as well as "metal" and "steel" for example, as also apparent to a person skilled in the art.

In addition, although the preferred embodiments of the present invention as illustrated in the accompanying drawings comprise various components and although the preferred embodiments of the leveling blade 3 and corresponding vibrating screed 1 as shown consist of certain geometrical configurations as explained and illustrated herein, not all of these components and geometries are essential to the invention and thus should not be taken in their restrictive sense, i.e. should not be taken as to limit the scope of the present invention. It is to be understood, as also apparent to a person skilled in the art, that other suitable components and cooperations thereinbetween, as well as other suitable geometrical configurations may be used for the vibrating screed 1 and corresponding parts according to the present invention, as briefly explained and inferred herein, without departing from the scope of the invention.

Broadly described, the vibrating screed 1 according to the present invention, as shown in the accompanying drawings, is a screed device for leveling

surfaces made of a malleable material, such as concrete and the like, prior to the hardening thereof, so as to ensure a fairly smooth surface, in applications well known in the art (construction, renovation, etc.).

The vibrating screed 1 according to the present invention is particularly advantageous in that it comprises a leveling blade 3 having a particular profile, enabling to overcome some of the disadvantages associated with leveling blades known in the prior art. Indeed, as better shown in Figures 2-5, and according to a preferred embodiment of the present invention, the leveling blade 3 is used for mounting onto a support bracket 5 of a vibrating screed 1, and preferably comprises a substantially vertical portion 7, a substantially slanted portion 9, and a substantially horizontal portion 11. As better shown in Figures 2 and 5, the substantially vertical portion 7 is preferably used for removably mounting onto the support bracket 5 of the vibrating screed 1, and preferably also has front and rear sides 7a,7b, as well as first and second ends 7c,7d. Preferably also, the substantially slanted portion 9 extends rearwardly from the second end 7d of the substantially vertical portion 7, and has inner and outer sides 9a,9b, as well as first and second ends 9c,9d. Preferably also, the substantially horizontal portion 11 extends frontwardly from the second end 9d of the substantially slanted portion 9, and has top and bottom sides 11a,11b, as well as first and second ends 11c,11d.

As can be easily understood when referring to Figure 2, it is worth mentioning that the second end 7d of the substantially vertical portion 7 corresponds essentially to the first end 9c of the substantially slanted portion 9, and that the second end 9d of the substantially slanted portion 9 corresponds essentially to the first end 11c of the substantially horizontal portion 11. Preferably also, transitions between adjacent portions 7, 9, 11 of the leveling blade 3 and the second end 11d of the substantially horizontal portion 11 thereof are substantially rounded off, as previously explained and as also better shown in Figure 2.

As discussed above, and according to the preferred embodiment of the present invention, the leveling blade 3 has a particular profile which enables it to

obtain improved performances when compared to what is possible with leveling blades known in the prior art. More particularly, and preferably, as also better shown in Figure 2, the outer side 9b of the substantially slanted portion 9 is at an angle Θ of about 160 degrees with respect to the rear side 7b of the substantially vertical portion 7. Preferably also, the ratio between the length of the rear side 7b of the substantially vertical portion 7 and the length of the bottom side 11b of the substantially horizontal portion 11 is about 0.4, whereas the ratio between the length of the rear side 7b of the substantially vertical portion 7 and the length of the substantially slanted portion 9 is about 1.26, and preferably as well, the top side 11a of the substantially horizontal portion 11 tapers off frontwardly with respect to the bottom side 11b thereof at an angle of about two (2) degrees, as can be easily understood when referring to Figure 2. According to yet a more preferred embodiment of the present invention, the wall thickness t_1 of the substantially vertical portion 7 is about 0.250 inches, whereas the horizontal distance d between the outer side 7b of the substantially vertical portion 7 and an outer corner 13 of the substantially slanted portion 9 is about 0.500 inches. As also better shown in Figure 2, the vertical rise r of said substantially slanted portion 9 is about 1.500 inches, and the length l_1 of the outer side 7b of the substantially vertical portion 7 is about 2.000 inches, while the bottom side 11b of the substantially horizontal portion 11 preferably has a length l_2 of about 5.000 inches. Preferably also, the aforementioned outer corner 13 of the substantially slanted portion 9 has a ratio of curvature of about 0.031, whereas an inner corner 15 of said substantially slanted portion 9 has a ratio of curvature of about 0.062. According to this particular and preferred embodiment of the leveling blade 3, the second end 11d of the substantially horizontal portion 11 would have a thickness t_2 of about 0.125 inches, and a bottom corner 17 thereof would have a ratio of curvature of about 0.015, whereas an upper corner 17 thereof would have a ratio of curvature of about 0.125.

It is of course to be understood that these particular dimensions and geometrical configurations are given as way of an example only, so as to illustrate what a preferred profile of the leveling blade 3 according to the present invention

would look like, but it is also to be understood that several other modifications could be made thereto, while carrying out essentially the same functions and obtaining substantially the same resulting advantages, and without departing from the scope of the present invention, as apparent to a person skilled in the art.

According to the present invention, there is also provided a vibrating screed 1 for leveling or surfacing a surface of a substantially malleable material, such as concrete and the like, and the vibrating screed 1 preferably comprises a support bracket 5, a leveling blade 3 such as the aforementioned or other, being mounted on the support bracket 5, and a vibrating-generating assembly 21, the vibrating-generating assembly 21 being operatively mounted onto the support bracket 5 for imparting vibrations to the leveling blade 3 via the support bracket 5, as can be easily understood when referring to Figures 1-5 and 9.

Preferably also, and as better shown in Figures 1, 3, 5, 10 and 11, the vibrating screed 1 further comprises a handling assembly 23, operatively connected to the support bracket 5 via at least one vibration-damping joint 25, for handling the vibrating screed 1. Even more preferably, the handling assembly 23 comprises a pair of handle bars 27, each handle bar 27 having an end operatively connected to the support bracket 5 via at least one vibration-damping joint 25, as better shown and as can be easily understood from Figures 3-5. Preferably also, the ends of the handle bars 27 are each connected to a corresponding connecting plate 29, each connecting plate 29 being operatively connected to the support bracket 5 via at least one vibration-damping joint 25, as better shown in Figures 3 and 5. Preferably also, and as better shown in Figure 5, each vibration-damping joint 25 comprises a sleeve made of an elastic material, and having an inner bore, each vibration-damping joint 25 being connected between a given connecting plate 29 and the support bracket 5 via a corresponding fastener extending through said inner bore of the vibration-damping joint 25 and having extremities in abutment with outer portions of the given connecting plate 29 and the support bracket 5. It is worth mentioning that several different types of fasteners could be used in order to achieve the above-mentioned end result and advantages, a bolt

assembly with a conventional bolt and corresponding nut being illustrated in the embodiment of Figure 5, as way of example. Obviously, other suitable fasteners may be used without departing from the scope of the present invention, as apparent to a person skilled in the art.

Furthermore, and according to a preferred embodiment of the present invention, each connecting plate 29 is substantially rectangular and is preferably operatively connected to the support bracket 5 via a pair of vibration-damping joints 25 being mounted respectively to corresponding opposite ends of each substantially rectangular connecting plate 29, as better shown in Figures 1 and 5.

It is worth mentioning also that instead of having a single connecting plate 29 for a given end of a handle bar 27, other configurations could be employed for the present invention, namely by providing a unique and transversely elongated connecting plate 29 onto which both ends of the handle bars 27 would be appropriately connected, said unique connecting plate 29 being then appropriately mounted onto the support bracket 5 of the vibrating screed 1 via a suitable number of vibration-damping joints 25, as can be easily understood by a person skilled in the art.

Preferably also, and according to another preferred aspect of the present invention, each handle bar 27 comprises first and second sections 27a,27b operatively connected to one another, the second section 27b being adjustably pivotable with respect to the first section 27a, as can be easily understood when comparing Figures 3 and 4. Preferably also, and as better shown in Figures 1 and 4, the handling assembly 23 comprises a cross-bar 31 extending between the first sections 27a of the handle bars 27, and preferably also, the cross-bar 31 comprises a recessed segment 33 in a substantially middle portion of said cross-bar 31, as better shown in Figure 4, so as to facilitate a grasping and handling of the vibrating screed 1, when not in use, for example.

According to one preferred aspect of the present invention, the second section 27b of each handle bar 27 may be adjustably pivotable with respect to the first section 27a thereof along a substantially vertical plane, so as to for example, adjust the degree of tilt of the second section 27b of a given handle bar 27 with respect to the ground surface onto which the vibrating screed 1 is to be displaced, and thereby enabling for a more ergonomic handling and use of an operator. However, and according to another preferred aspect of the present invention, the vibrating screed 1 may be provided with suitable means so that the second section 27b of each handle bar 27 may be adjustably pivotable with respect to the first section 27a thereof and against the cross-bar 31, as can be better understood when referring to Figures 3 and 4, so as to minimize the space taken up by the handling assembly 23 (i.e. handle bars 27, etc.) when the vibrating screed 1 is not in use, and thereby minimizing space taken up by the vibrating screed 1 when not in use, which is advantageous for storing purposes.

Preferably also, each handle bar 27 could be provided with a third section 27c, as can be easily understood when referring to Figures 10 and 11, which would be operatively connected to the second section 27b of a given handle bar 27, the third section 27c being adjustably pivotable with respect to the second section 27b along a substantially vertical plane, so that said third section 27c of the handle bar 27 could be adjustably tilted with respect to the second section 27b, or indirectly, with respect to the ground surface onto which the vibrating screed 1 is to be operated on, thereby enabling for any easier and more ergonomic use for a given operator of the vibrating screed 1, depending on the physical features or capabilities thereof.

Preferably also, and as can be easily understood when referring to Figures 1, 10 and 11, the vibrating screed 1 preferably comprises a control system 35 for controlling an extent of vibrations being generated by the vibration-generating assembly 21, and said control system 35 can be conveniently mounted onto a corresponding component of the vibrating screed 1, namely on or adjacent to a motor driving the same, and being preferably linked to a corresponding extremity

of the handle bar 27, and preferably also, to a third section 27c thereof, said third section 27c being preferably provided with a corresponding actuator 37 so as to remotely be able to control the control system 35 by a simple operation of the actuator 37 being positioned conveniently adjacent to the handle 39 of the extremity of the handle bar 27, as better shown in Figures 10 and 11.

According to another preferred aspect of the present invention, at least one handle bar 27 or other suitable component of the vibrating screed 1 could be provided with a corresponding support leg 41 for supporting the vibrating screed 1 when not in use, that is, for enabling the vibrating screed 1 to be balanced or kept in a substantially upright configuration as a result of the support leg 41 appropriately acting as a support between said corresponding at least one handle bar 27 and a ground surface, for example. In such a preferred embodiment, an extremity of the support leg would be provided with a corresponding joint being removably insertable into a corresponding component of said at least one given handle bar 27, and a corresponding section 27a,27b,27c thereof, as can be easily understood by a person skilled in the art.

Referring now to Figures 1-4 and 9, one can easily understood that according to a preferred embodiment of the present invention, the vibration-generating assembly 21 comprises a motor cooperating with a shaft 43, the shaft 43 being drivable by the motor and having an extremity provided with an eccentric cam 45 so as to impart vibrations to the system, and ultimately, to the leveling blade 3, when rotatably driven by the motor. As previously mentioned, the vibrating screed preferably comprises a control system 35 for controlling an extent of vibrations being generated by the vibration-generating assembly 21, and said control system 35 could be controlled directly or remotely, via a suitable linkage, for example, with corresponding actuator 37 being preferably provided on a corresponding handle 39 of a handle bar 27, as previously explained, or ultimately, could be remotely controlled via other suitable means, such as with a remote control for example, as can be easily understood by a person skilled in the art.

Referring now to Figures 5 and 6, there is shown how the preferred embodiment of the support bracket 5 of the vibrating screed 1 according to the present invention is preferably substantially L-shaped, having a substantially horizontal portion 47 with top and bottom sides 47a, 47b, and a substantially vertical portion 49 with front and rear sides 49a, 49b, the front side 7a of the substantially vertical portion 7 of the leveling blade 3 being removably connectable onto the rear side 49b of the substantially vertical portion 49 of the support bracket 5 via suitable fasteners, such as bolts and the like, or other suitable means, cooperating with corresponding holes or components provided on the leveling blade 3 and support bracket 5 respectively, as apparent to a person skilled in the art.

Preferably also, and as better shown in Figure 9, an important aspect of the present invention resides in that the shaft 43 of the vibrating-generating assembly 21 is a one-piece shaft 43, also referred to here as a "monoshaft" 43, and preferably also, the substantially horizontal portion 47 of the support bracket 5 is provided with a corresponding orifice 51 through which the shaft 43 of the vibration-generating assembly 21 extends, as better illustrated in Figure 6.

Furthermore, in order to be able to generate vibrations or pulses, and to transmit them to the vibrating screed 1, and more particularly to the leveling blade 3 thereof, so as to be able to carry out a proper leveling or surfacing of a malleable material with the leveling blade 3 being imparted such vibrations, this is preferably carried out by having an eccentric cam 45 being removably mountable onto the extremity of the shaft 43, as better shown in Figures 3, 6, 8 and 9. Preferably also, and so as to facilitate the interchangeability and ease of repair and maintenance of the components, the eccentric cam 45 preferably comprises a bore 53 for removably inserting the cam 45 into the extremity of the shaft 43 and a transversal hole 55 for receiving a corresponding fastener 56 for removably securing the cam 45 onto said shaft 43, as can be easily understood when referring to Figures 8 and 9. Preferably also, and in continuing with a desire to facilitate interchangeability of components, and facilitate a maintenance and/or a repair thereof, the vibrating

screed 1 also comprises at least one support bearing 57 for supporting a portion of a shaft 43 of the vibration-generating assembly 21, beneath the substantially horizontal portion 47 of the support bracket 5, each support bearing 57 having a corresponding hole 59 through which the shaft 43 extends, and being removably connectable to a given side of the support bracket 5, as better shown in Figure 3, and as can be easily understood from Figure 6. Preferably also, this is conveniently carried out in that each support bearing 57 is preferably provided with a pair of flanges 61 removably mounted onto the given side of the support bracket 5 by means of corresponding fasteners, such as bolts and the like, as well as other corresponding means, as apparent to a person skilled in the art.

Preferably also, and as can also be easily understood from Figure 9, each support bearing 57 preferably comprises a one-piece component where a recess is defined therein for inserting the corresponding bearing and said piece being integrally provided with the above-mentioned corresponding flanges 61.

Preferably also, the vibrating screed 1 according to a preferred embodiment of the present invention comprises a casing 63 being removably mounted to the given side of the support bracket 5 and being shaped and sized for encasing each support bearing 57 so as to protect the same, as can also be easily understood when referring to Figure 9, and the casing 63 is preferably provided with a hole 65 on the front portion of said casing 63, so as to namely, be able to visualize the inner content thereof, and more particularly be able to visualize the support bearings 57 encased within said casing 63, as better shown in Figure 4.

As better shown in the accompanying drawings, the vibrating screed 1 comprises a main mounting bracket (i.e. "support" bracket 5), which is preferably L-shaped. Preferably also, the leveling blade 3 to be used for leveling off a surface is removably connectable onto the substantially vertical portion 49 of the support bracket 5 by means of suitable fasteners, such as screws, bolts, rivets, washers, and the like, and the substantially horizontal portion 47 of the support bracket 5 is destined to transmit a vibratory movement from the motor to the leveling blade 1,

and also destined for receiving handle bars 27 in order to handle, guide and operate the vibrating screed 1. As better shown in Figures 3, 4, 6 and 9, and as can be easily understood therefrom, a shaft 43 of the motor passes through a corresponding orifice 51 of the second flange of the support bracket 5, said shaft 43 being preferably provided with a cam 45 mounted eccentrically at the end thereof, said shaft being rotated by the motor so as to impart the above-mentioned vibratory movement to the apparatus and thus the leveling blade 3. An actuator 37 provided on one of the handle bars 27 may be activated in order to control the force provided by the motor to the shaft 43, and thus in order to control the vibratory movement to be imparted to the blade 3.

As may now be better appreciated from the above-discussed, several improvements have been incorporated into the present leveling blade 3 and corresponding vibrating screed 1 in order to overcome several of the prior art disadvantages mentioned above.

For example, the particular profile of the leveling blade 3, better exemplified in Figure 2, allows for a smoother leveling off of a material to be spread over a given floor surface, as contrasted with the segmented profile of a conventional leveling blade.

Furthermore, the vibration-damping joints 25 ("vibrating dampers" or "shock absorbers"), preferably made of an elastomeric material, are preferably used for operatively connecting the extremity of the handle bars 27 to the mounting flange of the support bracket 5, in order to minimize vibration transmission thereinbetween. It is important to note that a fastener (e.g. bolt) is used to connect a given vibration-damping joint 25 to a corresponding handle bar extremity and that another fastener (e.g. bolt) is preferably used for connecting the same vibration-damping joint 25 to the second flange of the support bracket 5, but that said two (2) fasteners preferably do not touch each other within the vibration-damping joint 25, preferably made of an elastomeric material as mentioned above, so as to minimize vibration transmission.

Moreover, the handle bars 27 of the vibrating screed 1 are preferably foldable inwardly towards a common transversal support or cross-bar 31, as can be easily understood by the representation better exemplified in Figure 4, so as to minimize the space occupied by the apparatus when it is not used and kept in storage. It is worth mentioning also that the handle bars 27 may be devised differently so as to enable other different folding configurations, whether towards the common transversal cross-bar 31, or whether towards other components of the vibrating screed 1, so as to enable for example the handle bars 27 to be positioned at a corresponding tilted configuration with respect to the surface to be leveled, and thus enable a user of the vibrating screed 1 a more ergonomic control and use of the device, as aforementioned.

Also, the motor for imparting vibratory movement to the leveling blade 3 is preferably provided with a single and integral shaft 43 ("monoshaft") provided at its extremity, as previously explained and as better exemplified in Figure 9, with an eccentrically mounted cam 45, for generating the vibratory movement, such as monoshaft providing greater rigidity to the apparatus and being more easily interchangeable.

Finally and preferably, two (2) distinct pieces, namely the support bearings 57, better exemplified in Figure 6, are removably mountable onto the corresponding support bracket 5 (i.e. "the third component"), replacing thus the use of a conventional monoblock, by enabling to interchange either one of these three (3) pieces in the event of repair and/or maintenance. Furthermore, the preferred provision of a casing 63 helps to protect these components, while still being easily interchangeable.

It is worth mentioning also that the vibrating screed 1, and the different components thereof, as exemplified hereinabove, are preferably made of suitable materials, such as metallic materials, composite materials, and the like, which are preferably rigid enough to withstand the loads to which the vibrating screed 1 may

be subjected to, depending on the particular applications therefor, as apparent to a person skilled in the art. Preferably also, these materials are provided with suitable features, such as corrosion resistant properties, so as to enable the vibrating screed 1 and the different components thereof to be subjected to water conditions and the like, so as to enable a proper cleaning thereof after operation with a malleable material, such as concrete and the like.

According to another aspect of the present invention, there is also provided a kit comprising different components for assembling a vibrating screed according to the present invention, such as the ones briefly described herein and such as the ones exemplified in the accompanying drawings.

As may now also be better appreciated, the present invention is also a substantial improvement over the prior art in that, by virtue of its design and components, the vibrating screed 1 is very simple and easy to use, as well as is very simple and easy to manufacture and/or assemble, without compromising the reliability of its functions. Hence, it may now be appreciated that the present invention represents important advantages over other related vibrating screed devices known in the prior art, in terms of performance, manoeuvrability, ergonomics, transportation, and costs.

Of course, numerous modifications could be made to the above-described embodiments without departing from the scope of the invention, as defined in the appended claims.

CLAIMS:

1. A vibrating screed for leveling a surface of a substantially malleable material, the vibrating screed comprising:

a support bracket;

a leveling blade mounted on the support bracket;

a vibration-generating assembly, the vibration-generating assembly being operatively mounted onto the support bracket for imparting vibrations to the leveling blade via the support bracket; and

a handling assembly, operatively connected to the support bracket via at least one vibration-damping joint, for handling the vibrating screed, the handling assembly comprising a pair of handle bars, each handle bar having an end being operatively connected to the support bracket via at least one vibration-damping joint, the ends of the handle bars being each connected to a corresponding connecting plate, each connecting plate being operatively connected to the support bracket via at least one vibration-damping joint.

2. A vibrating screed according to claim 1, wherein each vibration-damping joint comprises a sleeve made of an elastomeric material, and having an inner bore, each vibration-damping joint being connected between a given connecting plate and the support bracket via at least one corresponding fastener inserted into said inner bore and having an extremity in abutment with an outer portion of either one of the given connecting plate and support bracket.

3. A vibrating screed according to claim 1 or 2, wherein each handle bar comprises first and second sections operatively connected to one another, the second section being adjustably pivotable with respect to the first section, the handling assembly further comprising a cross-bar extending between the first

sections of the handle bars, the second section of each handle bar being adjustably pivotable with respect to the first section thereof and against the cross-bar.

4. A vibrating screed according to claim 3, wherein each handle bar comprises a third section operatively connected to the second section thereof, the third section being adjustably pivotable with respect to the second section along a substantially vertical plane.

5. A vibrating screed according to any one of claims 1-4, wherein the vibrating screed comprises a control system for controlling an extent of vibrations generated by the vibration-generating assembly, and where an actuator linked to the control system for controlling the same is provided adjacent to a handle of at least one handle bar.

6. A vibrating screed according to any one of claims 1-5, wherein at least one handle bar is removably provided with a support leg for supporting the vibrating screed when not in use.

7. A vibrating screed according to any one of claims 1-6, wherein the vibration-generating assembly comprises a motor cooperating with a shaft, the shaft being drivable by the motor and having an extremity provided with an eccentric cam so as to impart vibrations when rotatably driven by the motor.

8. A vibrating screed according to claim 7, wherein the support bracket is substantially L-shaped, having a substantially horizontal portion with top and bottom sides, and a substantially vertical portion with front and rear sides, and wherein the shaft of the vibration-generating assembly is a one-piece shaft, the substantially horizontal portion of the support bracket being provided with an orifice through which the shaft of the vibration-generating assembly extends.

9. A vibrating screed according to claim 7 or 8, wherein the eccentric cam is removably mountable onto the extremity of the shaft, the eccentric cam comprising a bore for inserting into the extremity of the shaft, and a transversal hole for receiving a fastener for securing the cam onto the shaft.

10. A vibrating screed according to claim 8 or 9, wherein the vibrating screed comprises at least one support bearing for supporting a portion of the shaft of the vibration-generating assembly, beneath the substantially horizontal portion of the support bracket, each support bearing having a hole through which the shaft extends, and being removably connected to a given side of the support bracket, each support bearing being provided with a pair of flanges removably mounted onto to the given side of the support bracket by means of fasteners.

11. A vibrating screed according to claim 10, wherein the vibrating screed comprises a casing removably mounted to the given side of the support bracket and being shaped and sized for encasing each support bearing so as to protect the same, the casing being provided with a hole on a front portion of said casing.

12. A vibrating screed according to claim 1, wherein each vibration-damping joint comprising a sleeve made of an elastic material, and having an inner bore, each vibration-damping joint being connected between a given connecting plate and the support bracket via at least one corresponding fastener inserted into said inner bore and having an extremity in abutment with an outer portion of either one of the given connecting plate and support bracket;

wherein each connecting plate is substantially rectangular and wherein each connecting plate is operatively connected to the support bracket via a pair of vibration-damping joints being mounted respectively onto corresponding opposite ends of each substantially rectangular connecting plate;

wherein each handle bar comprises first and second sections operatively connected to one another, and wherein the handling assembly further comprises a cross-bar extending between the first sections of the handle bars, the second section of each handle bar being adjustably pivotable with respect to the first section thereof and against said cross-bar, each handle bar further comprising a third section operatively connected to the second section thereof, the third section being adjustably pivotable with respect to the corresponding second section along a substantially vertical plane;

wherein the vibrating screed further comprises a control system for controlling an extent of vibrations generated by the vibration-generating assembly, and where an actuator linked to the control system for controlling the same is provided adjacent to a handle of at least one handle bar;

wherein the vibration-generating assembly comprises a motor cooperating with a shaft, the shaft being drivable by the motor and having an extremity provided with an eccentric cam so as to impart vibration when rotably driven by the motor, the shaft of the vibration-generating assembly being a one-piece shaft, and the support bracket being substantially L-shaped and having a substantially horizontal portion with top and bottom sides, and a substantially vertical portion with front and rear sides, the substantially horizontal portion of the support bracket being provided with an orifice through which the shaft of the vibration-generating assembly extends; and

wherein the vibrating screed further comprises at least one support bearing for supporting a portion of the shaft of the vibration-generating assembly, beneath the substantially horizontal portion of the support bracket, each support bearing having a hole through which the shaft extends, and being removably connected to a given side of the support bracket, each support bearing being provided with a pair of flanges removably mounted onto the given side of the support bracket by means of fasteners.

13. A vibrating screed according to any one of claims 1-11, wherein the leveling blade comprises:

a substantially vertical portion for removably mounting onto the support bracket of the vibrating screed, said substantially vertical portion having front and rear sides, and first and second ends;

a substantially slanted portion extending rearwardly from the second end of the substantially vertical portion, said substantially slanted portion having inner and outer sides, and first and second ends; and

a substantially horizontal portion extending frontwardly from the second end of the substantially slanted portion, said substantially horizontal portion having top and bottom sides, and first and second ends.

14. A vibrating screed according to claim 13, wherein the outer side of the substantially slanted portion is at an angle of about 160 degrees with respect to the rear side of the substantially vertical portion.

15. A vibrating screed according to claim 13 or 14, wherein the ratio between the length of the rear side of the substantially vertical portion and the length of the bottom side of the substantially horizontal portion is about 0.4, wherein the ratio between the length of the rear side of the substantially vertical portion and the length of the substantially slanted portion is about 1.26, and wherein the top side of the substantially horizontal portion tapers off frontwardly with respect to the bottom side thereof at an angle of about 2 degrees.

16. A vibrating screed according to any one of claims 13-15, wherein transitions between adjacent portions of the leveling blade and the second end of the substantially horizontal portion thereof are substantially rounded off.

17. A kit for assembling a vibrating screed such as the one defined in any one of claims 1-16, the kit comprising:

a support bracket;

a leveling blade mountable onto the support bracket;

a vibration-generating assembly, the vibration-generating assembly being operatively mountable onto the support bracket for imparting vibrations to the leveling blade via the support bracket; and

a handling assembly, operatively connectable to the support bracket via at least one vibration-damping joint, for handling the vibrating screed, the handling assembly comprising a pair of handle bars, each handle bar having an end being operatively connectable to the support bracket via at least one vibration-damping joint, the ends of the handle bars being each connectable to a corresponding connecting plate, each connecting plate being operatively connectable to the support bracket via at least one vibration-damping joint.

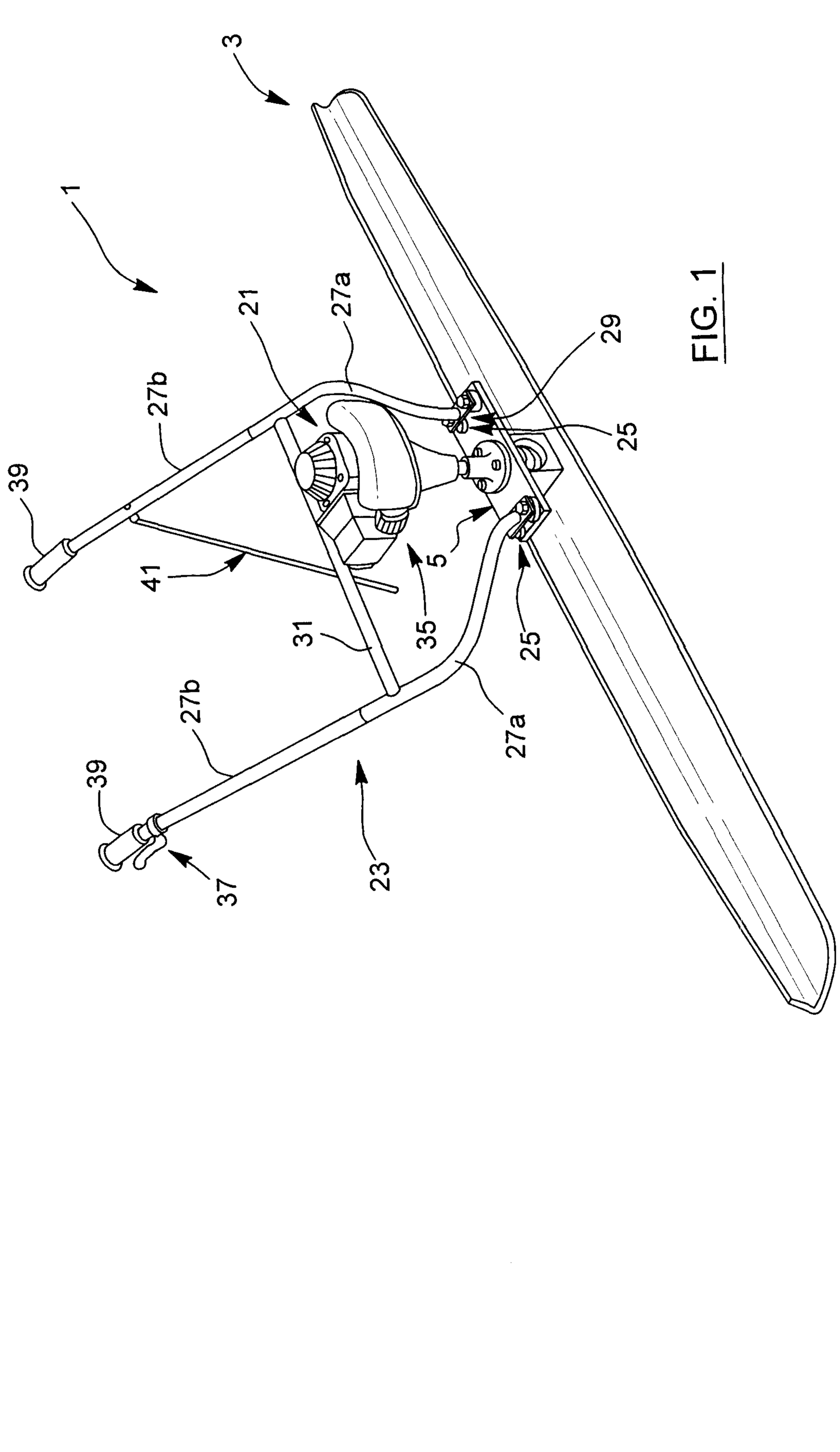

FIG. 1

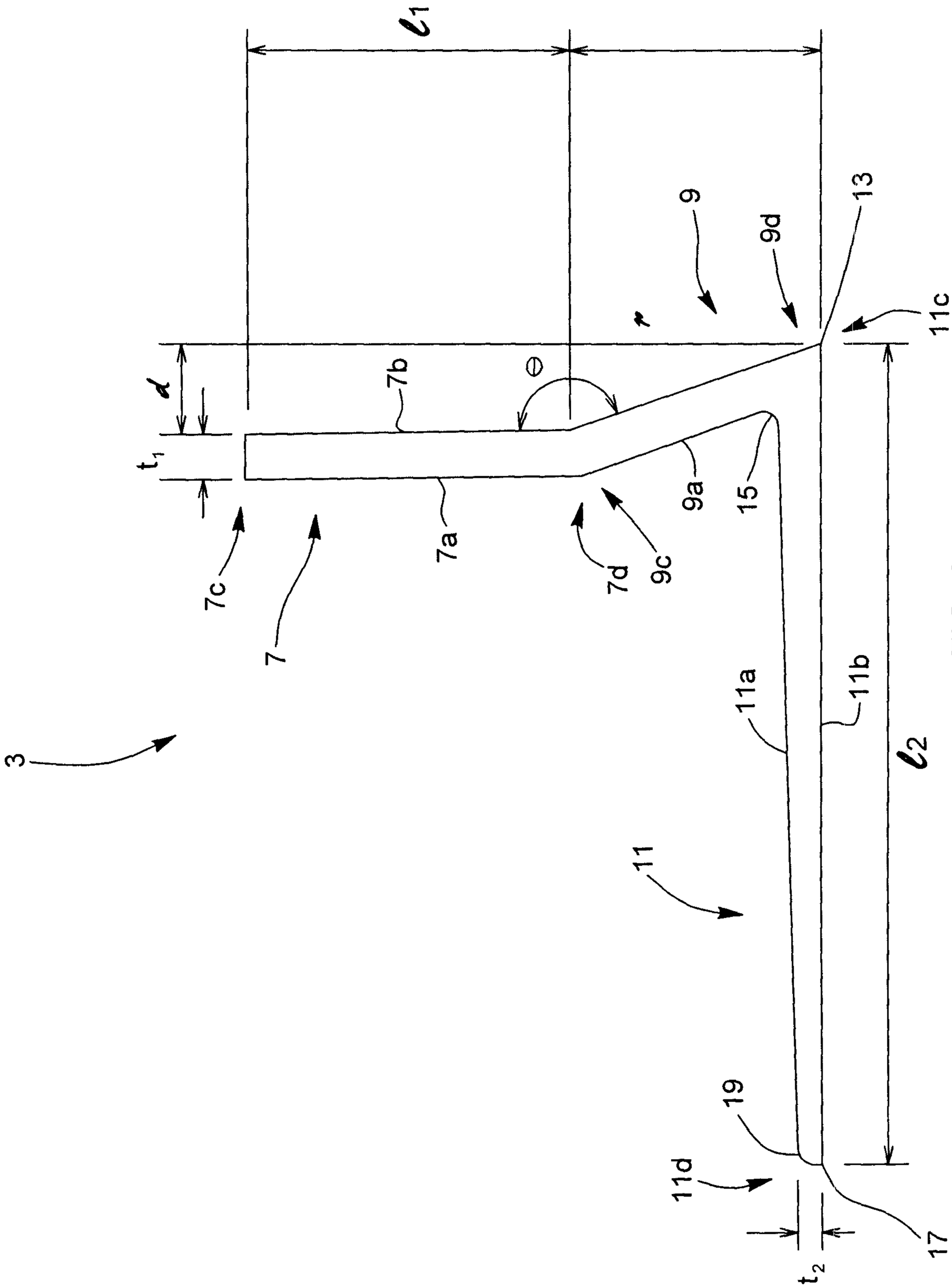
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FIG. 2

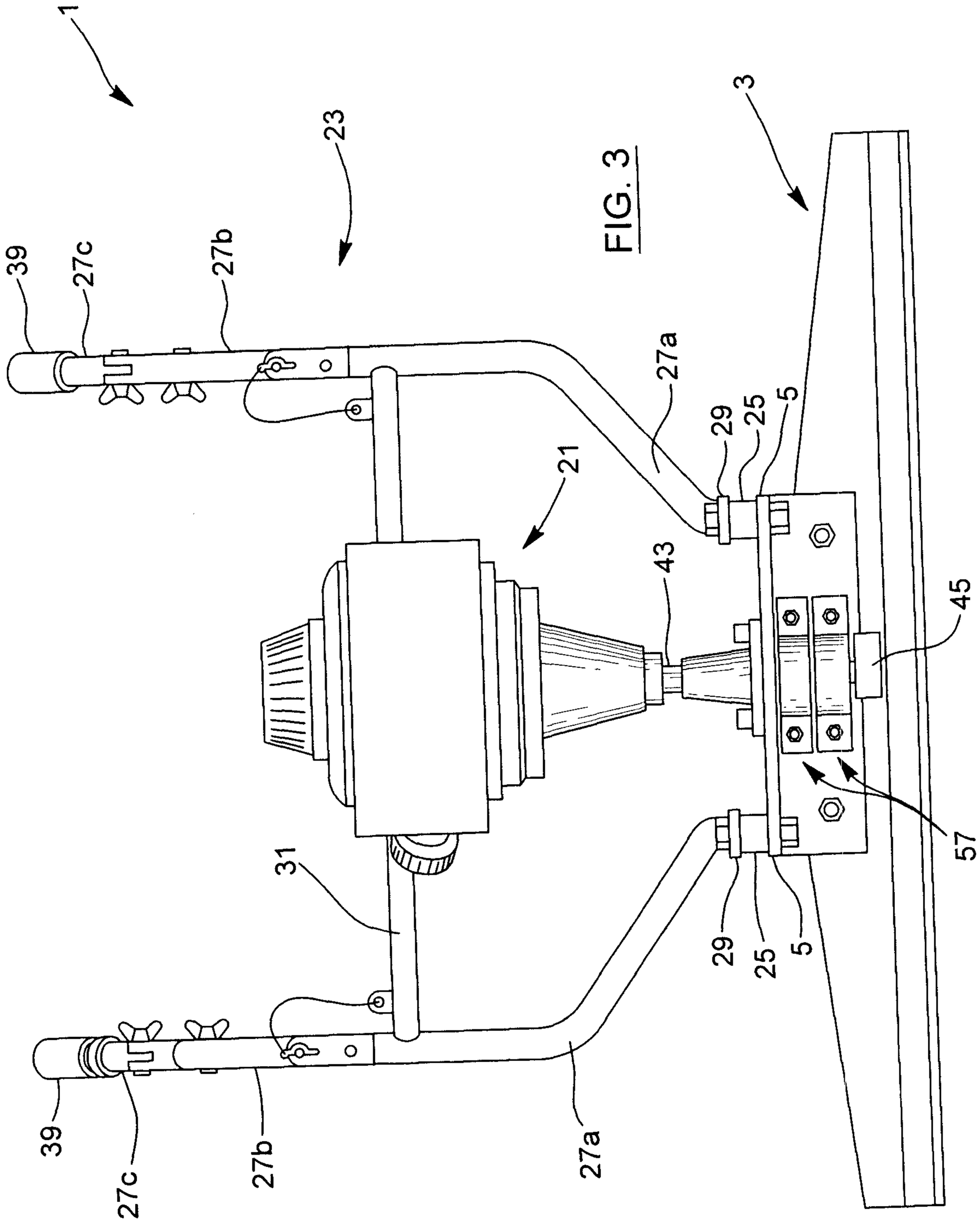


FIG. 3

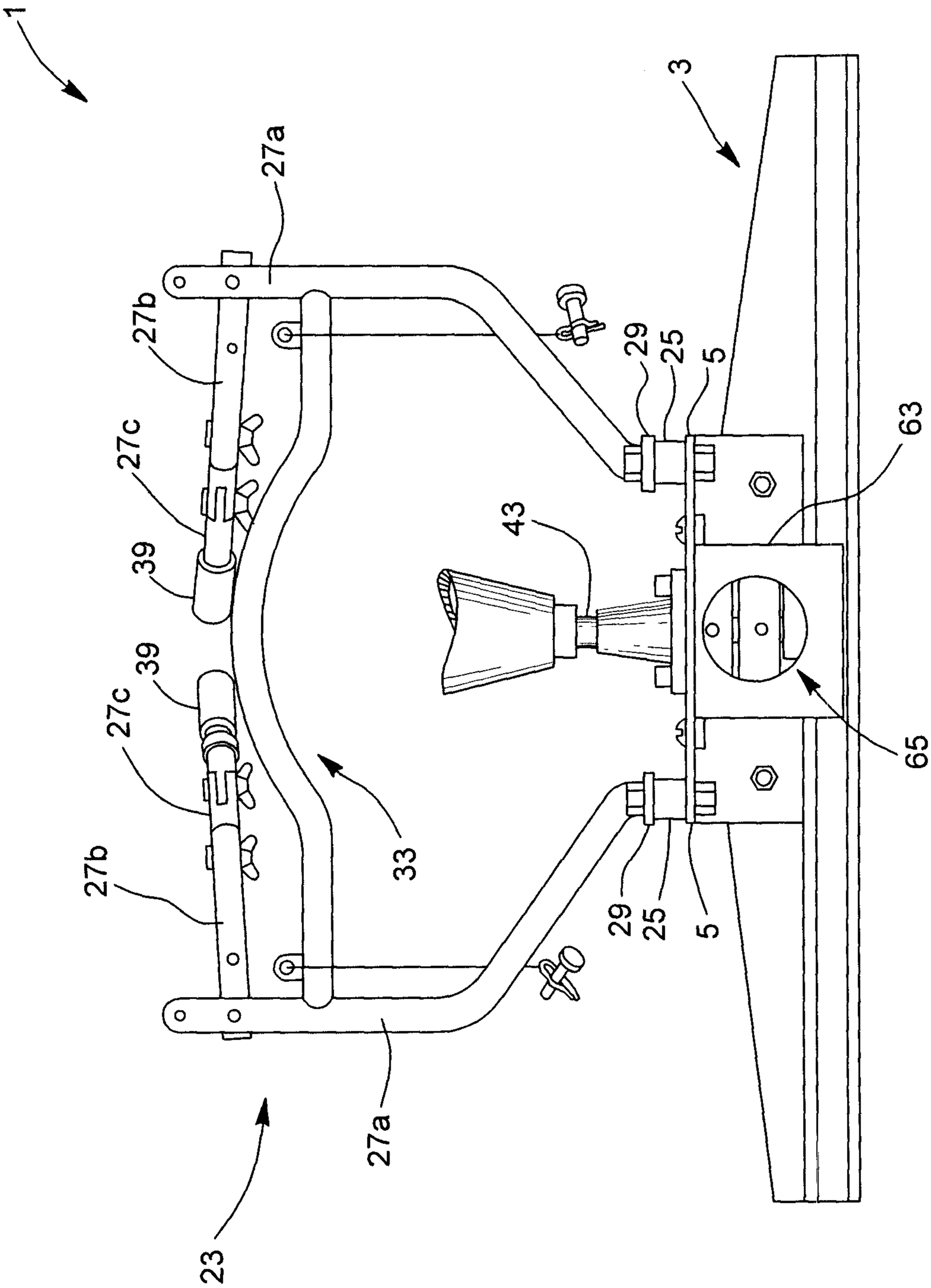


FIG. 4

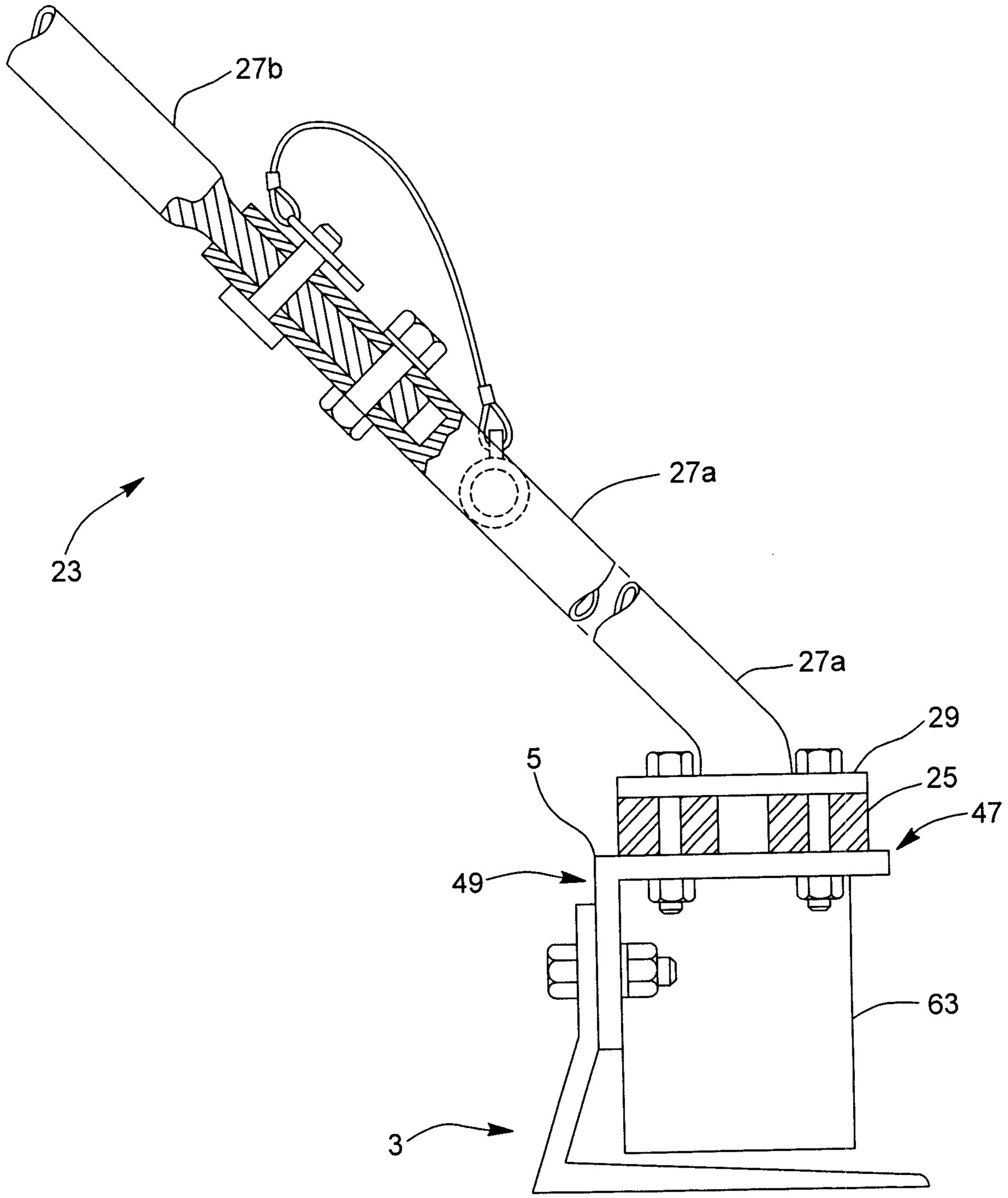


FIG. 5

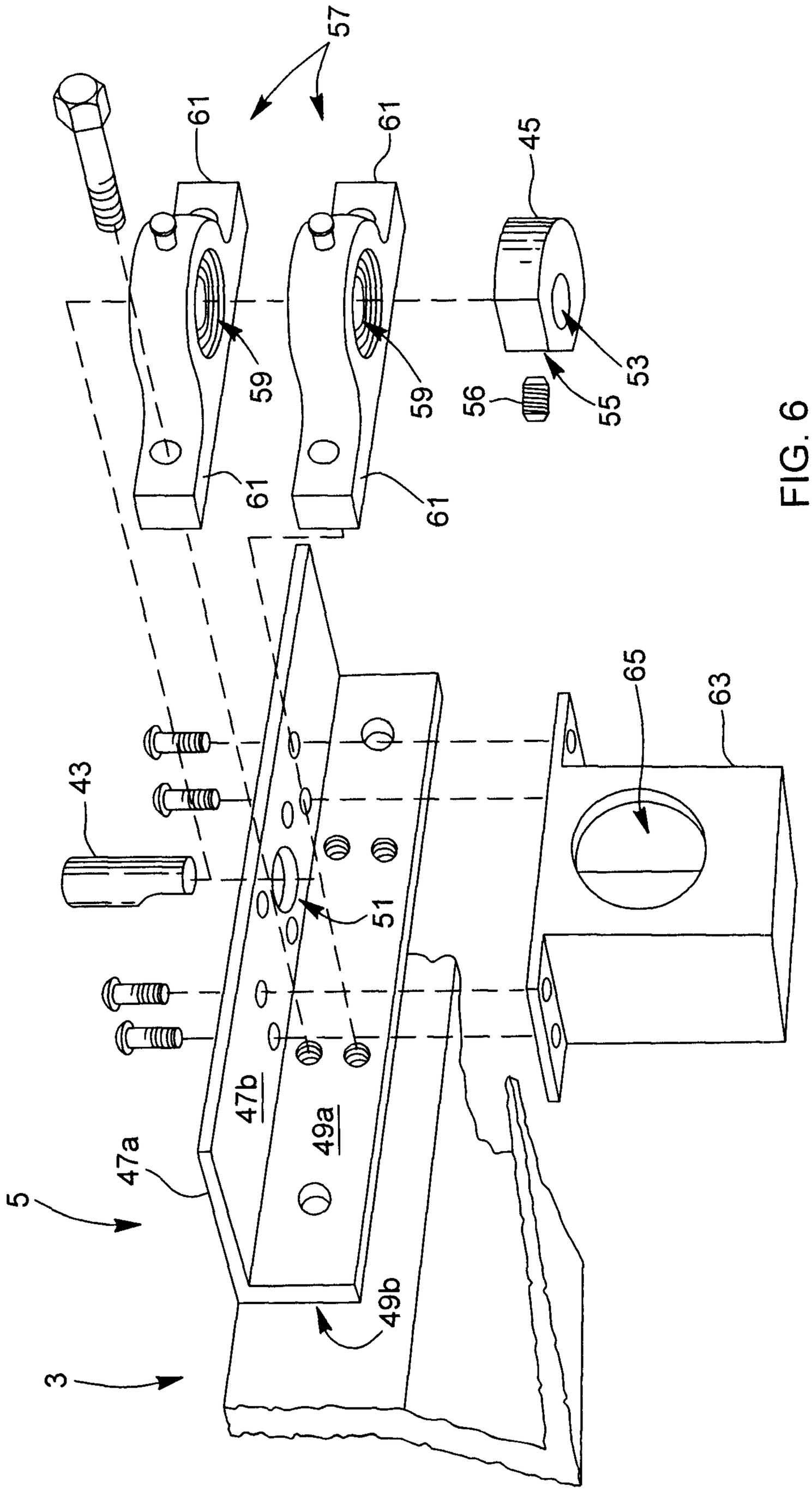


FIG. 6

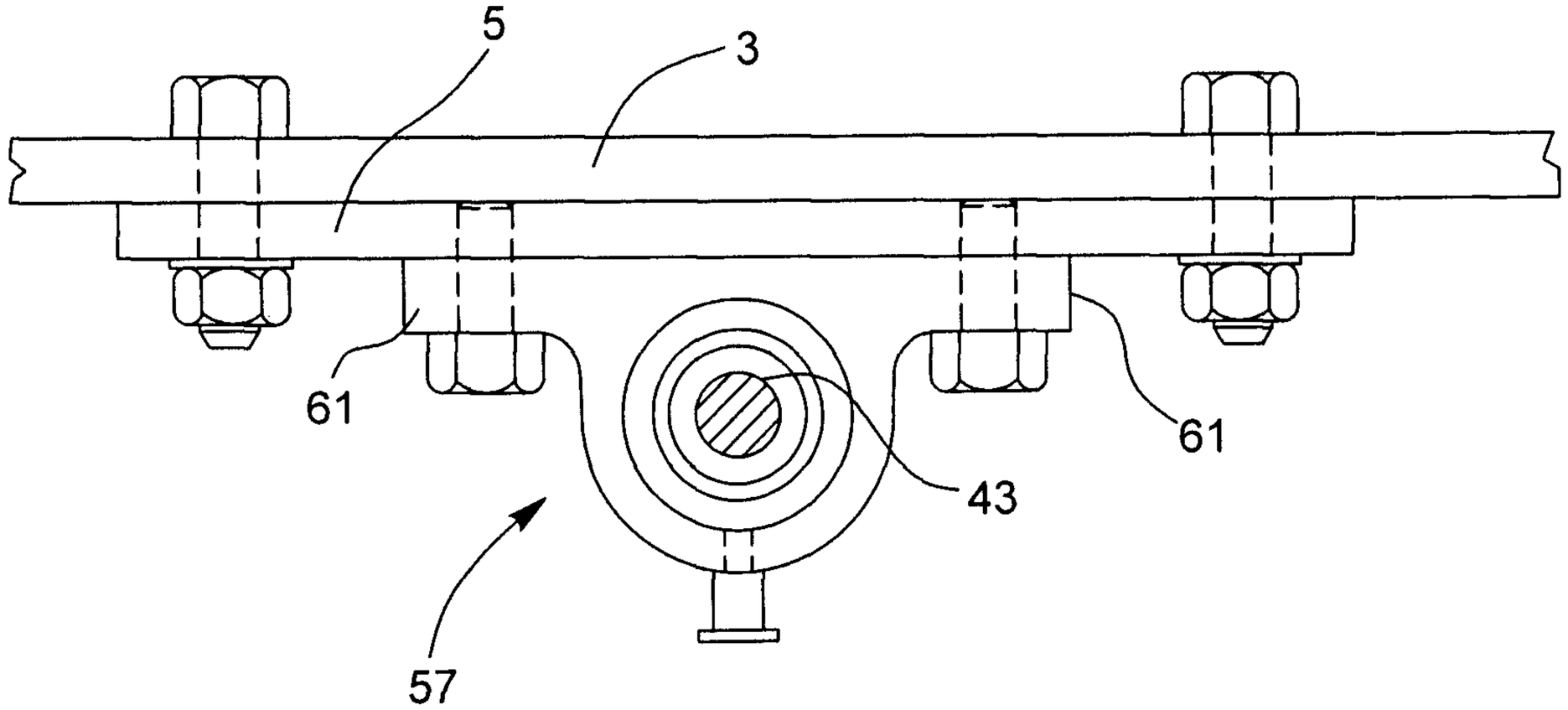


FIG. 7

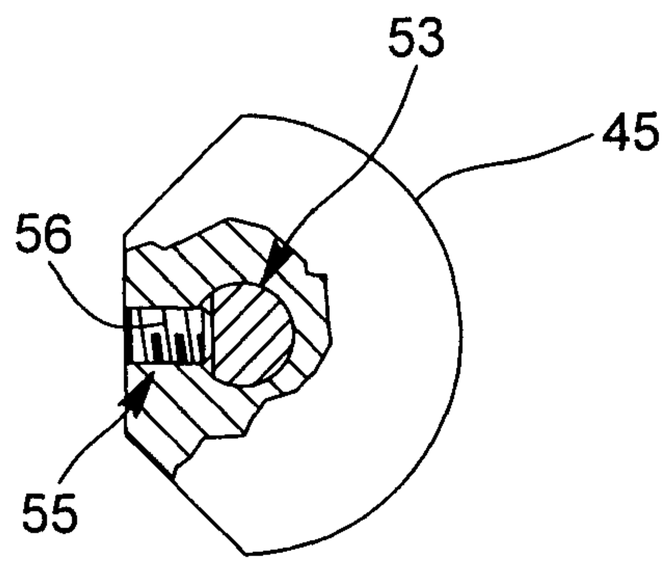


FIG. 8

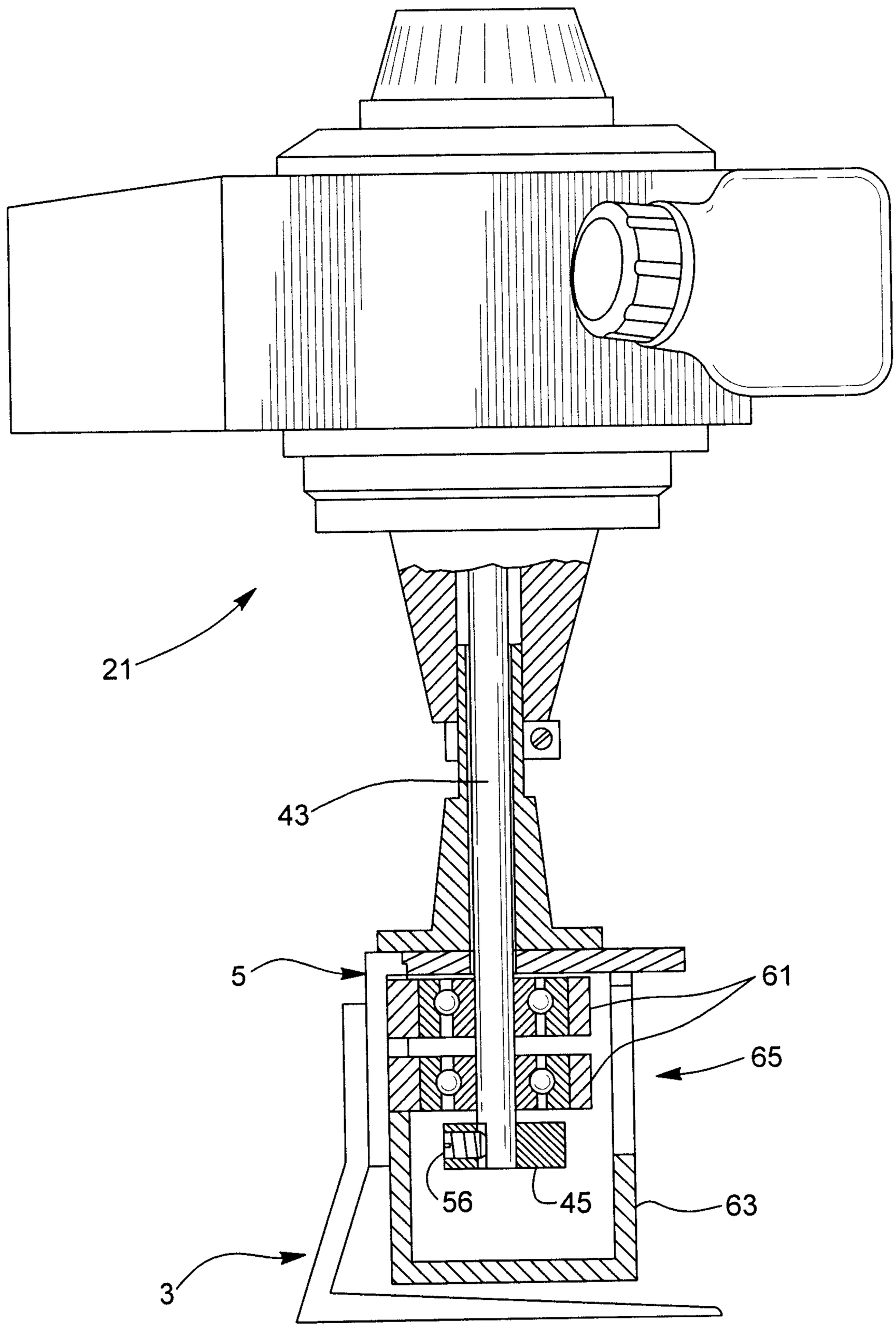


FIG. 9

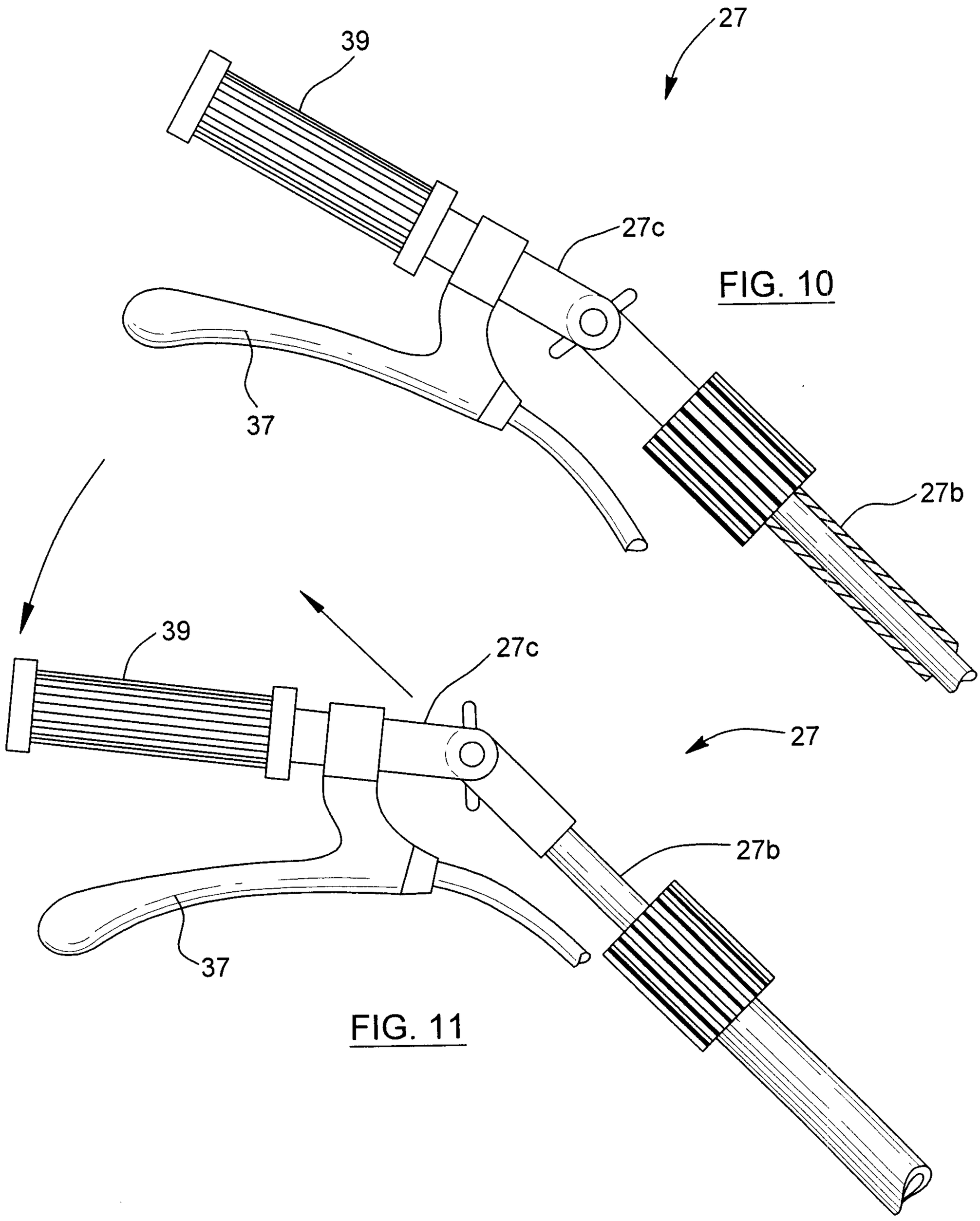
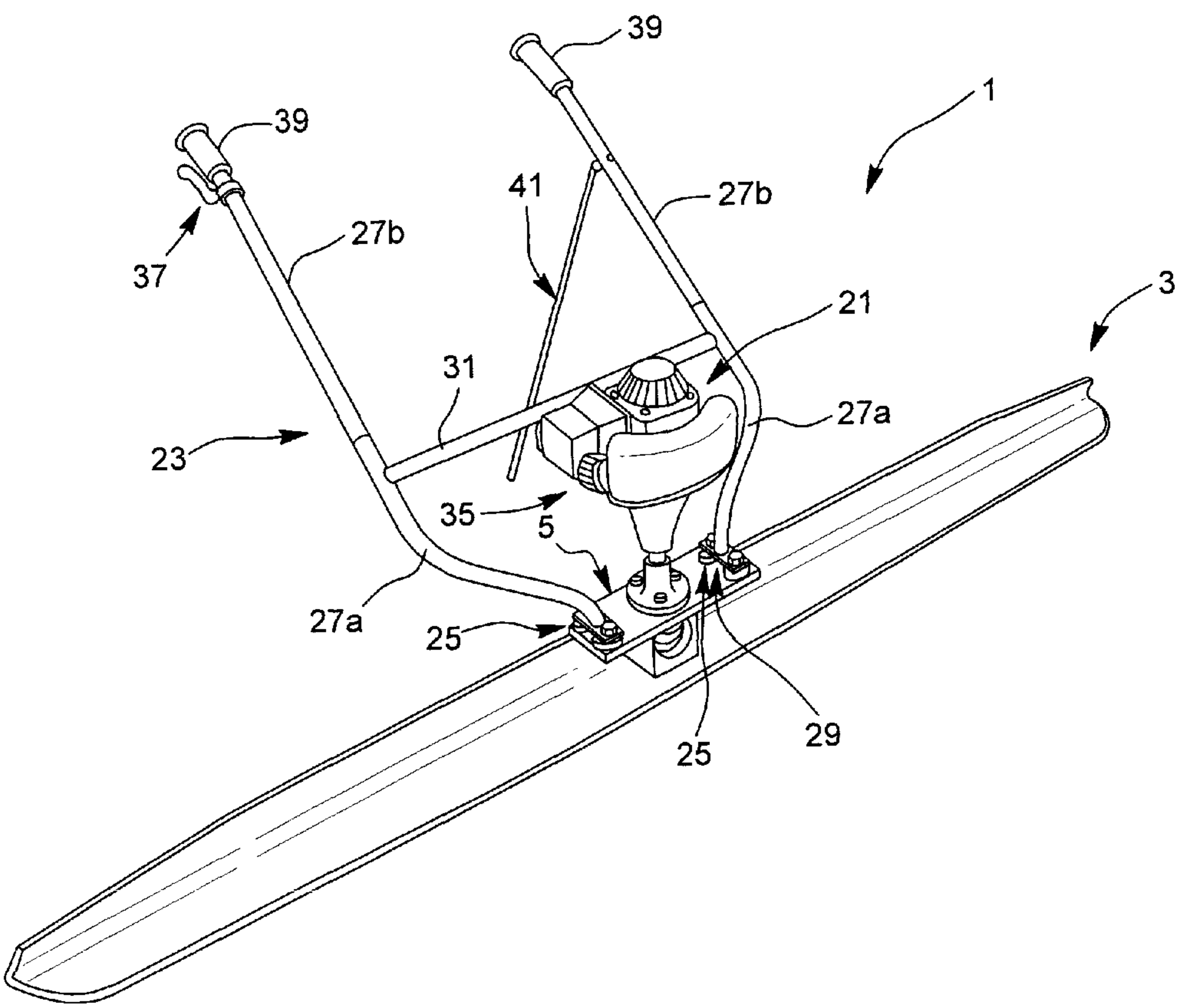


FIG. 10

FIG. 11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