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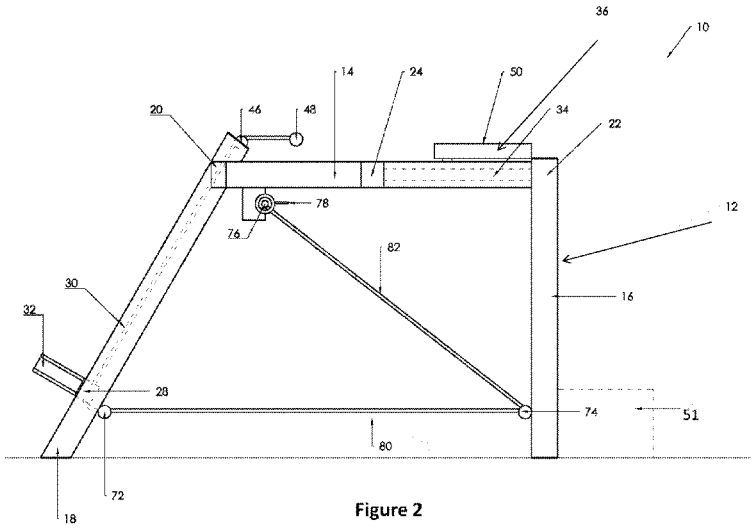

Figure 2

(57) Abstract: An adjustable load mechanism for an exercise device, the adjustable load mechanism including: at least one load point for application of force by a user, and a first load source comprising a tension assembly including an elastic portion, wherein the tension assembly is connected directly or indirectly to the at least one load point, and whereby a force applied to the at least one load point is transferred along an effective path through the tension assembly, and an adjusting mechanism operable to adjust the tension of the tension assembly, so as to vary the load required on the at least one load point, wherein the adjusting mechanism is operable whilst a load is applied to the tension assembly.

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Improvements in exercise devices

TECHNICAL FIELD

This invention relates to exercise devices.

BACKGROUND ART

Various exercise devices exist that allow a user to exercise one or more parts of the body, such as the legs and upper arms. However there are limited devices directed to convenient exercise of the lower arm and wrists of a user.

Many exercise devices utilise weights that are raised against gravity to provide a load. The load is adjusted before the exercise by changing the amount of weight that will be raised. Other devices may utilise an elastic member, such as a length of rubber that is stretched to provide the load. However, these devices do not allow the load to be adjusted and measured part way through the exercise.

DISCLOSURE OF THE INVENTION

In one broad form the invention provides an arm exercise device having a platform mounted for reciprocal motion along a first path, the platform having an arm support that in use is at a height that a human user may stand adjacent the platform with at least one forearm supported on the arm support.

The first path is preferably located in a plane and more preferably is a straight line. Most preferably the first path is a straight line in a horizontal plane.

The platform may be configured to provide different support to at least one forearm.

In a first configuration the platform may support the at least one forearm in a generally horizontal plane. In a second configuration the platform may support the at least one forearm in a vertically inclined plane. Preferably in the second configuration the plane is inclined so that in use the wrist of the at least one forearm is above the elbow of the at least one forearm.

The platform may have a base portion where the arm support is movable relative to the base portion. The base portion may be movable along at least one support member. The base portion may include at least one slider, roller, wheel or similar that engages the at least one support member. In the

preferred implementation the at least one support member comprises at least one support rod received in at least one tubular slider on the base, whereby the base may slide along the support rod. Preferably there are two spaced apart and parallel support rods, each of which is received in a single tubular slider. The base may have two or more tubular sliders for each support rod. The base may have wheels that run on a support surface.

The platform may have an arm support that is movable relative to the base portion. The arm support may be mounted for rotation about an axis extending at 90 degrees to the first path. In use this axis is preferably horizontal.

The arm support may have a first portion and a second portion, whereby in use the second portion is closer to a user than the first portion. The height of at least one of the first portion or the second portion may be movable relative to the height of the base portion.

The arm support is preferably mounted for rotation about the axis adjacent the second portion. The arm support may be rotated so that the first portion is vertically higher than the second portion.

The platform may include a retaining mechanism that enables the arm support to be retained in at least one rotated position. Preferably the retaining mechanism includes an elongate rod having at least one aperture into which a retaining member may be inserted.

The arm exercise device preferably includes a load generator connected directly or indirectly to at least one load point for connection with a use whilst the at least one forearm is supported on the platform, whereby movement of the platform requires application of a force applied against the load generator.

The at least one load point may include a handle, strap, loop, lever or other object. In the preferred implementation the at least one load point includes a handle for being held by a user's hand or hands

In one form the load generator includes a weight assembly constrained to move at least partially vertically, whereby movement of the platform moves the weight assembly vertically against gravity. The weight assembly may move only vertically or it may move both vertically and horizontally. In a preferred implementation the weight assembly moves both vertically and horizontally in a plane at about 30 degrees to the vertical.

In another broad form the invention provides an adjustable load mechanism for an exercise device, the adjustable load mechanism including a tension

assembly connected directly or indirectly to a handle for grasping by the user, at least a part of the tension assembly being elastic, whereby movement of the handle stretches at least part of the elastic part of the tension member.

The adjustable load mechanism may be combined with the arm exercise or other exercise device. The adjustable load mechanism may be the only source of load to the user or may be used with another load source, such as a weight assembly constrained to move at least partially vertically, whereby movement of the platform moves the weight assembly vertically against gravity.

Preferably the adjustable load mechanism is adjustable whilst a load is applied to the tension assembly so as to vary the load required on the at least one load point.

In another broad form the invention provides an adjustable load mechanism for an exercise device, the adjustable load mechanism including:

at least one load point for application of force by a user;

a first load source comprising a tension assembly including an elastic portion, wherein the tension assembly is connected directly or indirectly to the at least one load point, and whereby a force applied to the at least one load point is transferred along an effective path through the tension assembly, and

an adjusting mechanism operable to adjust the tension of the tension assembly, so as to vary the load required on the at least one load point, wherein the adjusting mechanism is operable whilst a load is applied to the tension assembly.

The tension assembly may include an elastic part and an inelastic part.

The adjustable load mechanism may include an adjusting mechanism to stretch the elastic part of the tension assembly.

The adjusting mechanism may be operative to cause less than the full length of the tension assembly to extend along the effective path.

The adjusting mechanism may include member such as a drum, spool, pulley, capstan or other object about which a portion of the tension assembly is wound upon.

The adjusting mechanism may be operative to adjust the effective path. The adjusting mechanism may adjust the length of the effective path. The

adjusting mechanism may adjust the position of the effective path.

The adjusting mechanism may include an engaging member that engages the tension assembly intermediate its ends, the member being movable to adjust the effective path. The engaging member may be a pulley, roller, rod or similar. The engaging member may clamp the tension assembly intermediate its ends.

The adjustable load mechanism may further include a second load source. The first load source and the second load source may be connected in series or in parallel.

The second load source may be a weight assembly connected directly or indirectly to the at least one load point and constrained to move at least partially vertically, whereby application of force by a user to the at least one load point moves the weight assembly vertically against gravity.

The adjustable load mechanism may include a tension measurement device which measures the tension in the tension assembly. The tension measurement device may be a strain gauge or an electrical transducer or similar.

These and other features of the invention will be apparent from the following non limiting description or preferred and other implementations of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front end view on an exercise device according to a first implementation of the invention.

Figure 2 is a side cross sectional view of the device of figure 1 taken along line AA in figure 1.

Figure 3 is a plan view of the device of figure 1.

Figure 4 is a schematic of the load adjusting mechanism of the device of figure 1.

Figure 5 is a side view of the arm support of the device of figure 1.

Figure 6 is a side view of the arm support of the device of figure 1.

Figure 7 is a schematic view of an alternate exercise device utilising a load adjusting mechanism according to the invention.

Figures 8 and 9 show perspective views of part of a load adjusting mechanism according to an alternative embodiment of the invention.

BEST MODE OF CARRYING OUT THE INVENTION

Referring to the figures there is shown an exercise device 10 that includes a frame 12. The frame includes two horizontal beams 14, two generally vertical rear legs 16 and two angled front legs 18. Cross bar 20 extends between legs 18 and beams 14 and their junction. Cross bar 22 extends between legs 16 and beams 14 and their junction whilst cross bar 24 extends between beams 14. A lower cross bar 26 extends between the lower ends of legs 18.

A weight assembly 28 is mounted on slide rods 30 which extend between upper and lower cross beams 20 and 26. In this implementation the weight assembly has a post 32 upon which one or more weights may be mounted to adjust the total mass of the weight assembly. The legs 18 and slide rods 30 are angled at about 30 degrees to the vertical. This is not essential but aids stability of the device, aids in keeping weights on the post 32 and also provides greater travel compared to a weight assembly moving on vertical slide rods.

Slide rods 34 extend in a horizontal plane between cross beams 22 and 24. An arm rest assembly 36 is mounted on the slide rods 34 for backward and forward motion between cross beams 22 and 24. In the preferred implementation the arm rest assembly 36 is provided with tubular mountings 40 in which the slide rods 34 are received. If desired the arm rest assembly 36 may be provided with wheels that run on the slide rods 34 or other support surface(s).

The slide rods 34 may be provided with springs 42 and/or rubber stoppers 38 at one or both ends of the rods next to the respective cross bars so as to provide cushioning at either end of the motion of the arm rest assembly 36.

A first tension member 44 extends upwards from the weight assembly 28 and over pulley 46. A handle 48 is provided at the free end for grasping by a user. In this implementation the handle is a simple cross bar extending either side of the tension member 44. In the preferred implementation the tension member 44 is substantially inelastic and is preferably a flat woven strap. However, other tension members, whether elastic or inelastic, may be used.

The height of the arm rest assembly 36 is such that a user can comfortably stand at the rear of the device, adjacent the rear legs 16 and cross bar 22 with their forearms resting generally horizontally on support surface 50 of the arm rest assembly 36. The effective height may be fixed or adjustable. This may be achieved by making the height of the horizontal arms 14 low enough for short people and then providing the arm rest assembly 36 with height

adjustment. Alternatively, a short user may stand on a step or similar 51 to be at the desired height.

The user positions their arms so that their hands extend beyond the arm rest assembly 36 so as to be able to grasp the handle 48. The user then optionally draws their arms and hands toward their body and simultaneously contracts the muscles of the forearms, pulling arm rest assembly 36 backwards whilst maintaining their forearms generally horizontal. This backwards action raises the weight assembly and thus provides weights exercise to the user. As mentioned, by varying the number and /or size of weights on the weight assembly the load the user experiences may be modified.

The arm rest assembly 36 preferably has a base structure 52 and the support surface 50 is mounted on the base structure. The support surface 50 of the arm rest assembly 36 is preferably attached by hinge 53 at its rear end 54 to the base structure 52 so that front end 56 may be pivoted upwards so the surface is inclined to the horizontal. A suitable retaining mechanism may be used to secure the support surface 50 at one or more different angles. In this implementation a rod 58 is pivotably mounted on the support surface 50 and passes into retainer tube 60. The rod 58 has a series of recesses, holes or apertures 59 spaced along its length and the tube 60 has an aperture through which a pin 62 may pass to engage in one of the holes 59, thereby retaining the rod and support surface 50 at a desired angle.

When the support surface 50 is angled, the device may be used with the most of forearms on the support surface 50 with the wrists extending beyond the front end. The handle may be grasped and the weight assembly lifted by rotation of the hands about their wrists, with the arm rest assembly 36 remaining stationary.

In this configuration the arm rest assembly 36 may be simply moved to engage the intermediate cross bar or the stops 38 on the slide rods 34. Alternatively one or both of the slide rods may be provided with means to prevent forward motion beyond one or more locations distant from the intermediate cross bar 24. As an example, one or both of the slide rods may have holes passing through themselves into which a pin may be passed to stop the arm rest assembly 36 moving forward past the pin.

Whilst the implementation described utilises a weight to provide a load, other means or providing a load may be used with the sliding arm rest assembly 36. Thus, for example, rather than raising a weight, the user may stretch an elastic member.

The features of the implementation described above thus provide an exercise device that may be used for exercise of a user's arms, whether by simple

raising or lowering a weight or other means. However, before the present invention, there was no user adjustability during the exercise stroke of the load, i.e. a user could not increase or decrease the load.

The present invention provides an ability to adjust the load at any time during the exercise, whether by the user or another person.

Attached to the weight assembly is a load adjustment assembly 64. The load adjustment assembly 64 includes a second tension assembly 66 connected to the weight assembly via strain gauge coupling 71. The second tension assembly 66 extends from the weight assembly via shafts 72 and 74 to a take up drum or pulley 76. This drum may be rotated, directly or indirectly, by a hand wheel or crank 78 or other mechanism. At least part of the second tension assembly 66 is made of elastic material and so by winding part of the second tension assembly 66 onto the drum the elastic part is stretched and so applies an additional load to the user. The drum may be driven by a worm gear drive such that the load cannot rotate the drum or a releasable ratchet mechanism or similar may be used to prevent the drum unwinding under load.

Figures 8 and 9 show detail of an alternative embodiment of a drum assembly. The drum assembly has a drum housing 77 with an attached bracket housing 90 which attaches the drum assembly to an attachment bracket 92 on the exercise device. Hand wheel 78 is connected to drum 76 via shaft 79, with drum 76 positioned within the drum housing. The inelastic portion 82 passes through an aperture 95 in the drum housing, where it is wound about the drum 76. Bearings 96 allow the shaft and drum to rotate within the drum housing, and brake winch 98 is operable to prevent rotation of the shaft and drum within the drum housing.

In this embodiment, the inelastic portion 82 has a series of marks or indicators 94 used to display an indication of the applied tension.

In the implementations shown the second tension assembly 66 has an elastic portion 80 that is attached at one end to the weight assembly and an inelastic portion 82 that extends from to the other end of the elastic portion 80 to the drum 76. Elastic portion 80 and inelastic portion 66 are joined at junction 67. Thus winding the tension assembly onto the drum by turning hand wheel 78 winds the inelastic portion 82 onto the drum 76 and stretches the elastic portion 80 whilst not changing the amount of the elastic portion 80 available for stretching. If desired the inelastic portion 82 could be attached to the weight assembly and the elastic portion 80 wound onto the drum. This arrangement would have the effect of reducing the amount of the elastic portion 80 available for stretching and so the elastic load created as the weight assembly is lifted would increase faster than in the configuration shown.

Whilst this arrangement provides the user with the ability to increase the preload on the weight assembly, it also provides the ability to vary the total load after raising the weight assembly. For example, the user may be doing grip exercises and wishes to increase or decrease the load. With the weight assembly raised the hand wheel 78 is rotated to wind in part of the second tension assembly 66, so increasing the load or wind out part of the second tension assembly 66, so decreasing the load. The load may be increased until the user cannot continue gripping the handle.

The strain gauge 71 provides a signal to meter or readout 73 that may be easily read by the user. The strain gauge 71 is mounted between the tension assembly and the weight assembly and so provides an indication of the additional load being provided by the loading adjustment mechanism. If desired the tension member may be mounted directly to the weight assembly with the strain gauge 71 mounted elsewhere in the path. If desired the strain gauge 71 may be mounted between the weight assembly and the first tension member 44. In that arrangement the readout 73 would provide the total load provided by the weight assembly and the loading adjustment mechanism 64.

It will be appreciated that the system can be reversed such that the tension reduces the net load and therefore the tension is of assistance rather than resistance to a user. For example, when the system is reversed, it can enable people with disabilities more scope for exercising. To achieve the reversed system, the tension assembly is connected so that it counteracts part of the load of the weight assembly, rather than adding to it.

It will be appreciated that this loading adjustment mechanism is not limited to use with the arm exercise device described and may be used with any exercise device, whether or not in combination with another load, such as a weight assembly that is raised.

As an example, Figure 7 schematically shows a pull down exercise device 100. A weight assembly 102 mounted on vertical slide rods 104. A tension member 106 extends upwards and over pulleys 108, 110 with a handle 112 at its free end. A user 114 may grasp the hand and pull the handle 112 downwards thereby raising the weight assembly. A second tension member assembly 116 extends from the weight assembly 102 via pulleys 118 and 120 to drum 122. Drum 122 may be rotated by a handle (not shown) to wind part of tension member 116 onto drum 122.

As with the implementation of Figures 1 to 6, the second tension member assembly 116 is formed at least partially of an elastic part and more preferably is formed of elastic part 126 connected to the weight assembly 102 and an inelastic part 128 that is wound onto the drum 122. The load on the second tension member assembly 116 may be indicated by providing a sensor

130 in line in the second tension member assembly 116. This may be connected between the elastic part 126 and inelastic part 128 and may be a simple spring load indicating device or may be an electrical transducer that provides a signal to a display unit 132.

Whilst both implementations shown in the representations have a part elastic tension member assembly, a tension member assembly that only has an elastic part and does not have an inelastic part may be used.

Whilst both implementations shown in the representations have the at least part elastic tension member assembly being wound onto a drum that is near the users hands, it will be appreciated that it is not necessary that the drum or other adjustment mechanism be near the user's hands. For example, a foot operated mechanism may be used.

Further, whilst the implementations wind a portion of the at least part elastic tension member assembly onto a drum, a similar result may be achieved by having an at least part elastic tension assembly extending to an anchor point rather than a drum. The effective length of the path followed could be varied to so as to vary the amount the elastic part is stretched. For example, the end connected to the drum in the implementations shown could be attached to a movable anchor point. Movement of the anchor point would stretch the at least part elastic tension assembly. The anchor point could be fixed but there could be one or more pulleys between along the path may be moved to increase the path length and so stretch the at least part elastic tension assembly.

Unless the context clearly requires otherwise, throughout the description and any claims the words "comprise", "comprising", and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

The features of the invention described or mentioned in this document may be combined in any combination of features where features are not mutually exclusive.

It will be apparent to those skilled in the art that many obvious modifications and variations may be made to the embodiments described herein without departing from the spirit or scope of the invention.

INDUSTRIAL APPLICABILITY

The invention has industrial applicability to exercise devices.

THE CLAIMS

1. An adjustable load mechanism for an exercise device, the adjustable load mechanism including:

at least one load point for application of force by a user, and

a first load source comprising a tension assembly including an elastic portion, wherein the tension assembly is connected directly or indirectly to the at least one load point, and whereby a force applied to the at least one load point is transferred along an effective path through the tension assembly, and

an adjusting mechanism operable to adjust the tension of the tension assembly, so as to vary the load required on the at least one load point, wherein the adjusting mechanism is operable whilst a load is applied to the tension assembly, and

further including a second load source comprising a weight assembly connected directly or indirectly to the at least one load point and constrained to move at least partially vertically, whereby application of force by a user to the at least one load point moves the weight assembly vertically against gravity wherein the adjusting mechanism is operable to adjust the length of the effective path.

2. The adjustable load mechanism of claim 1 wherein the adjusting mechanism is operable to adjust the position of the effective path.

3. The adjustable load mechanism of any one of the previous claims wherein the adjusting mechanism is operable to stretch the elastic portion of the tension assembly along the effective path.

4. The adjustable load mechanism of any one of the previous claims wherein the adjusting mechanism is operable to cause less than the full length of the tension assembly to extend along the effective path.

5. The adjustable load mechanism of any one of the previous claims wherein the adjusting mechanism includes a winding member about which a portion of the tension assembly is wound.

6. The adjustable load mechanism of claim 5 wherein the winding member is a drum, spool, pulley or capstan.

2012315469 04 Jun 2018

7. The adjustable load mechanism of any one of the previous claims wherein the adjusting mechanism includes an engaging member that engages the tension assembly intermediate its ends, the engaging member being movable to adjust the effective path.

8. The adjustable load mechanism of claim 7 wherein the engaging member is a pulley, roller or rod.

9. The adjustable load mechanism of claim 7 wherein the engaging member clamps the tension assembly intermediate its ends.

10. The adjustable load mechanism of any one of the previous claims wherein the tension assembly includes an inelastic portion connected in series with the elastic portion.

11. The adjustable load mechanism of any one of the previous claims wherein the first load source and the second load source are connected in series.

12. The adjustable load mechanism of any one of claims 1 to 10 wherein the first load source and the second load source are connected in parallel.

13. The adjustable load mechanism of any one of the previous claims comprising a tension indicator for indicating the tension in the tension assembly.

14. The adjustable load mechanism of claim 13 wherein the tension indicator comprises a strain gauge and/or an electrical transducer.

15. The adjustable load mechanism of claim 13 or claim 14 wherein the tension indicator comprises a plurality of marks or indicators on the tension assembly.

16. An exercise device including the adjustable load mechanism of any one of claims 1 to 15.

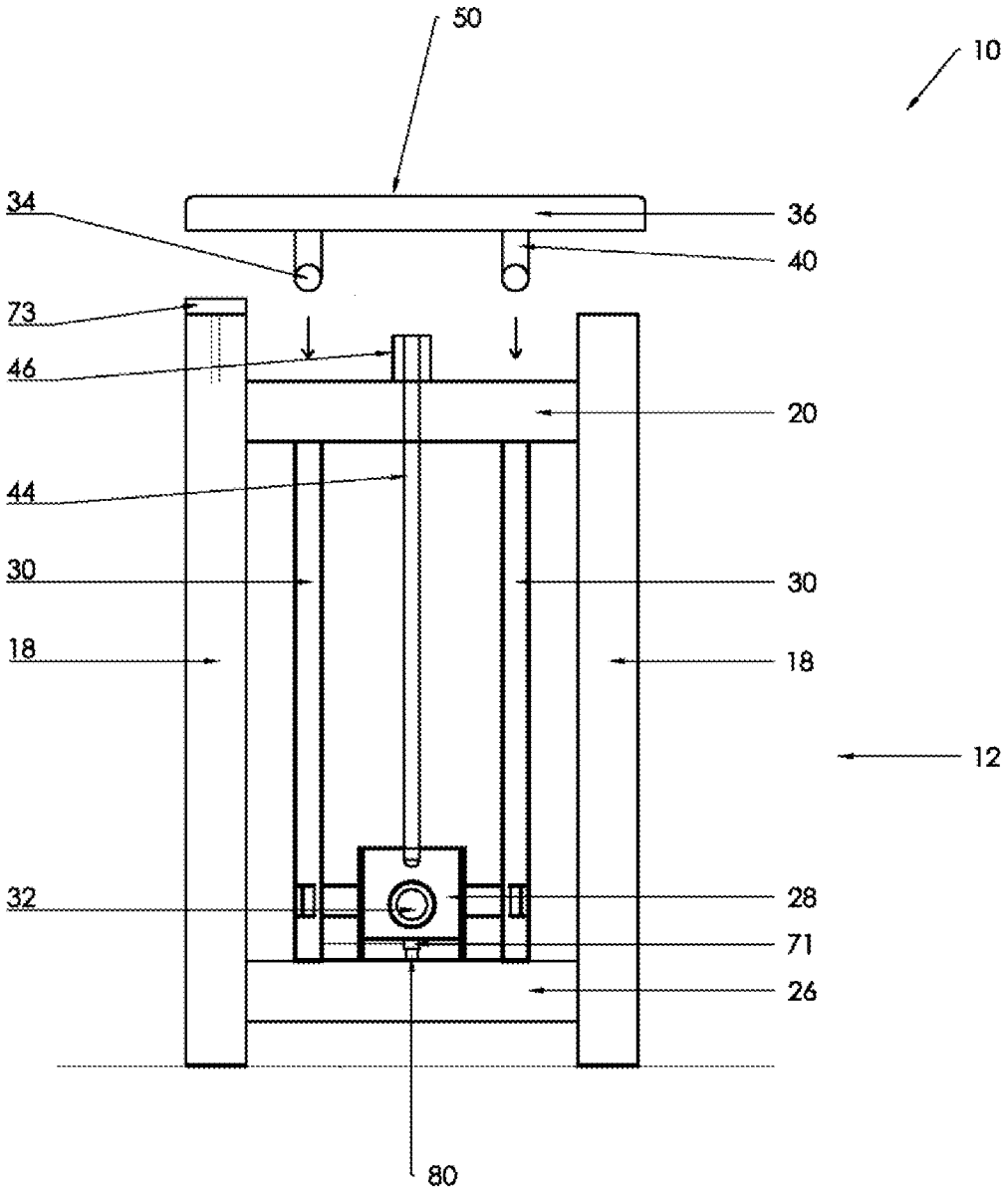


Figure 1

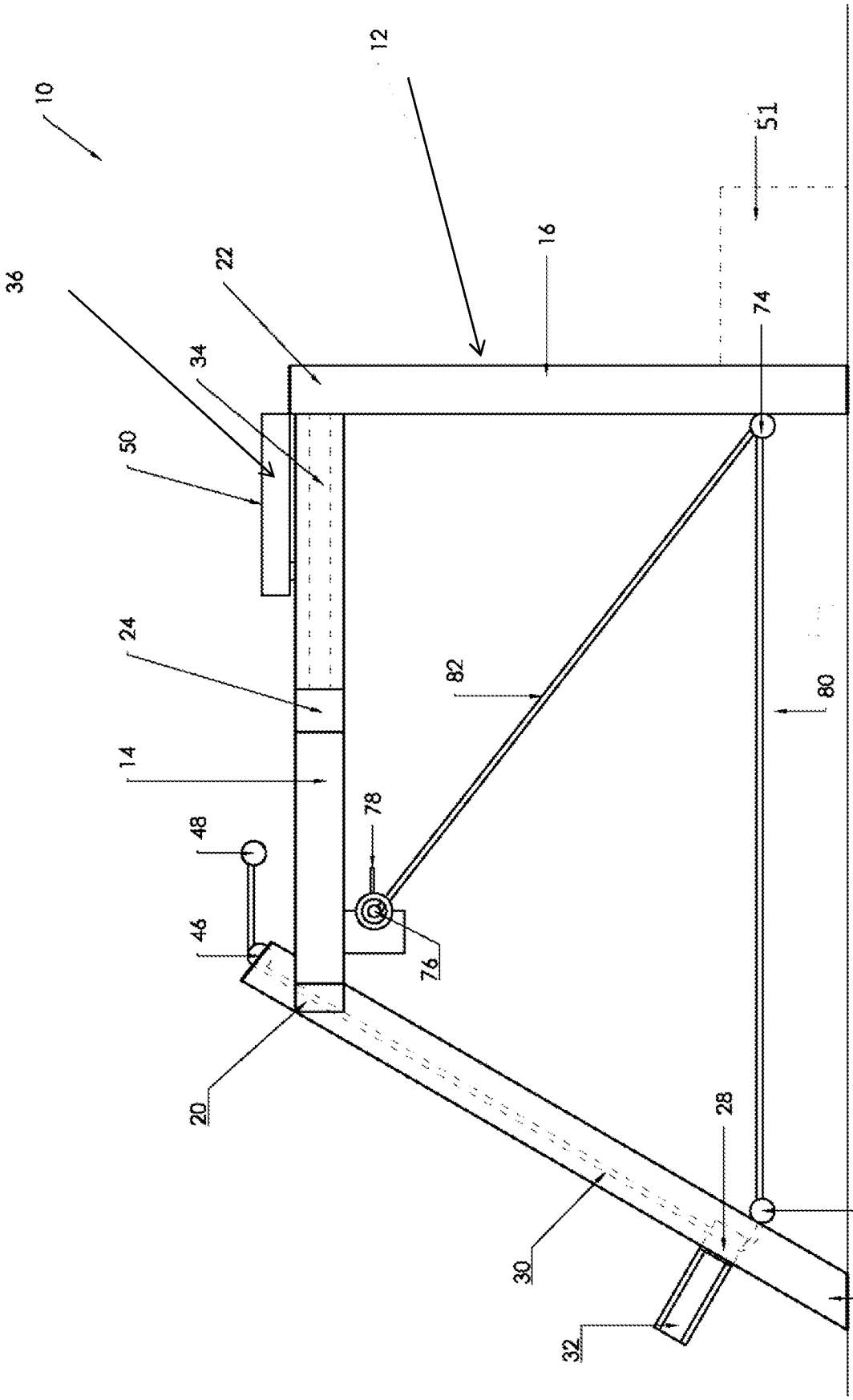
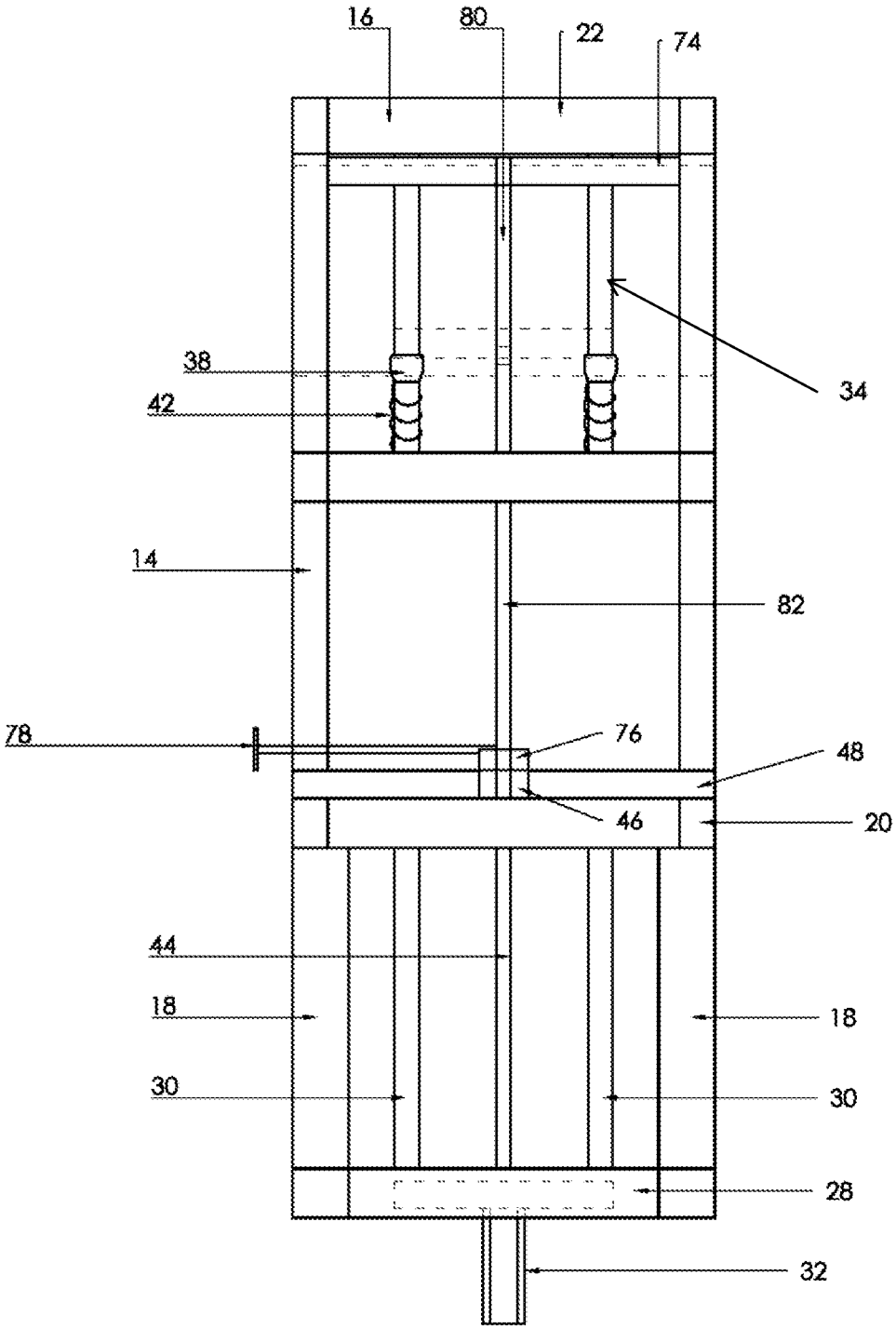


Figure 2



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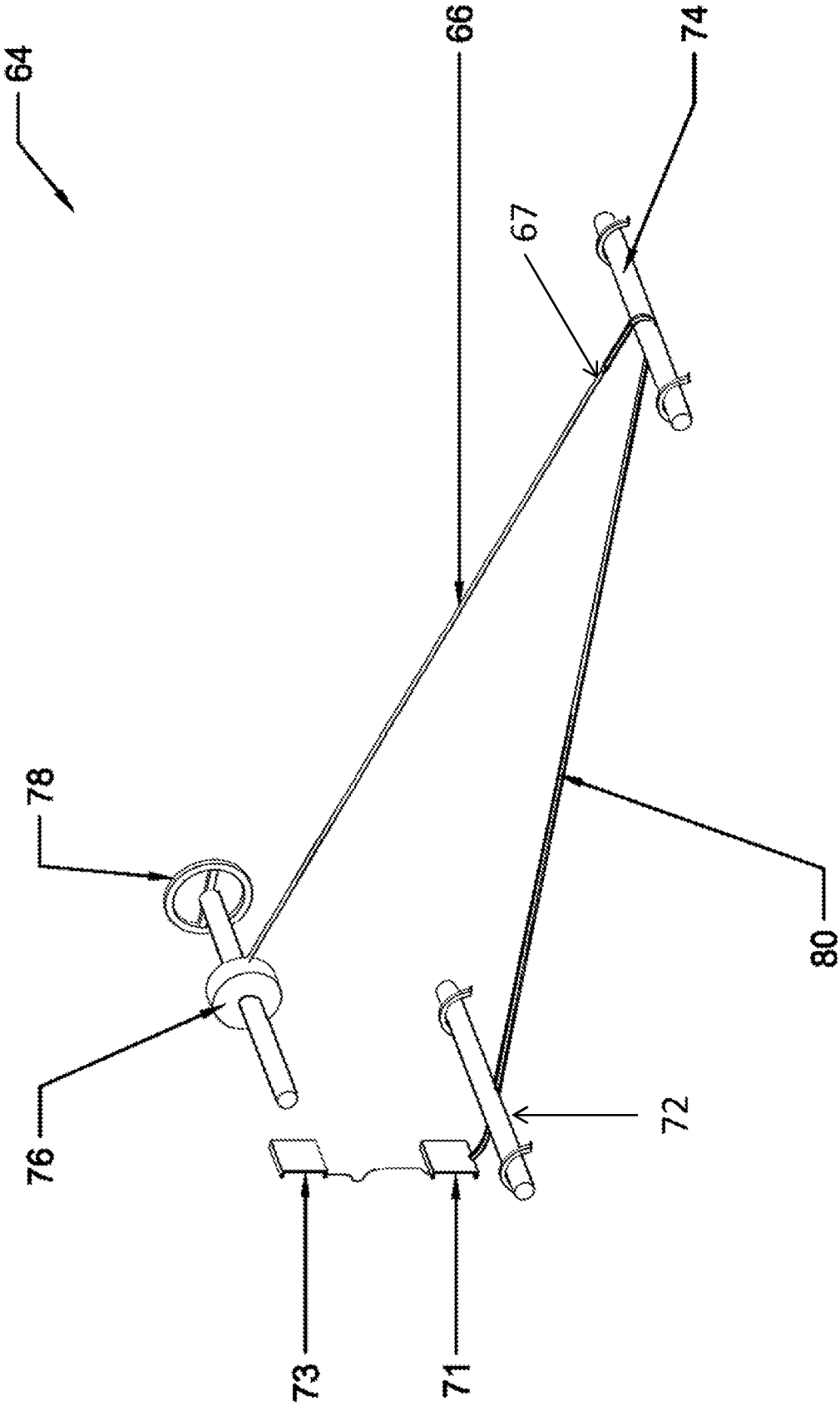

Figure 4

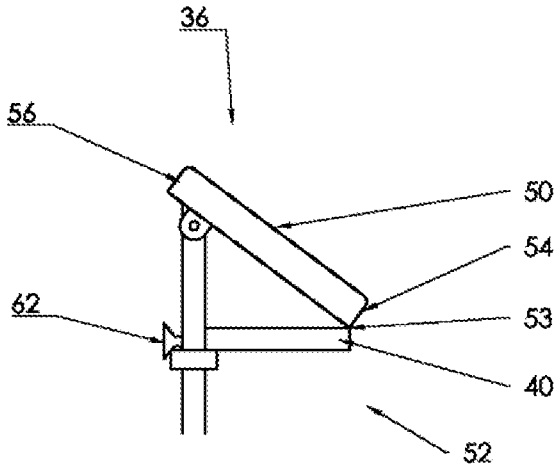

Figure 5

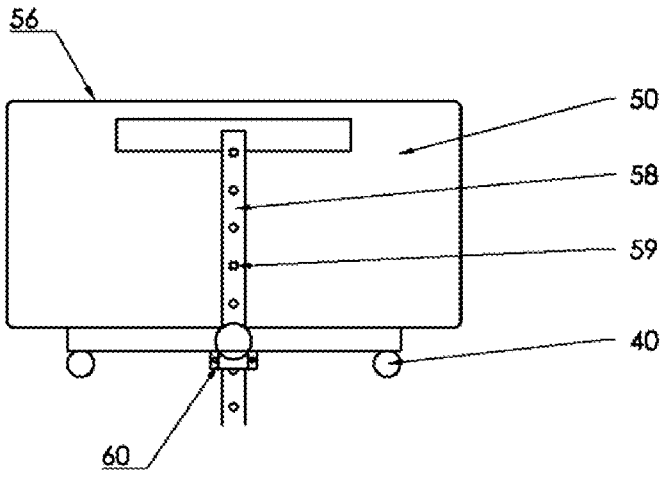

Figure 6

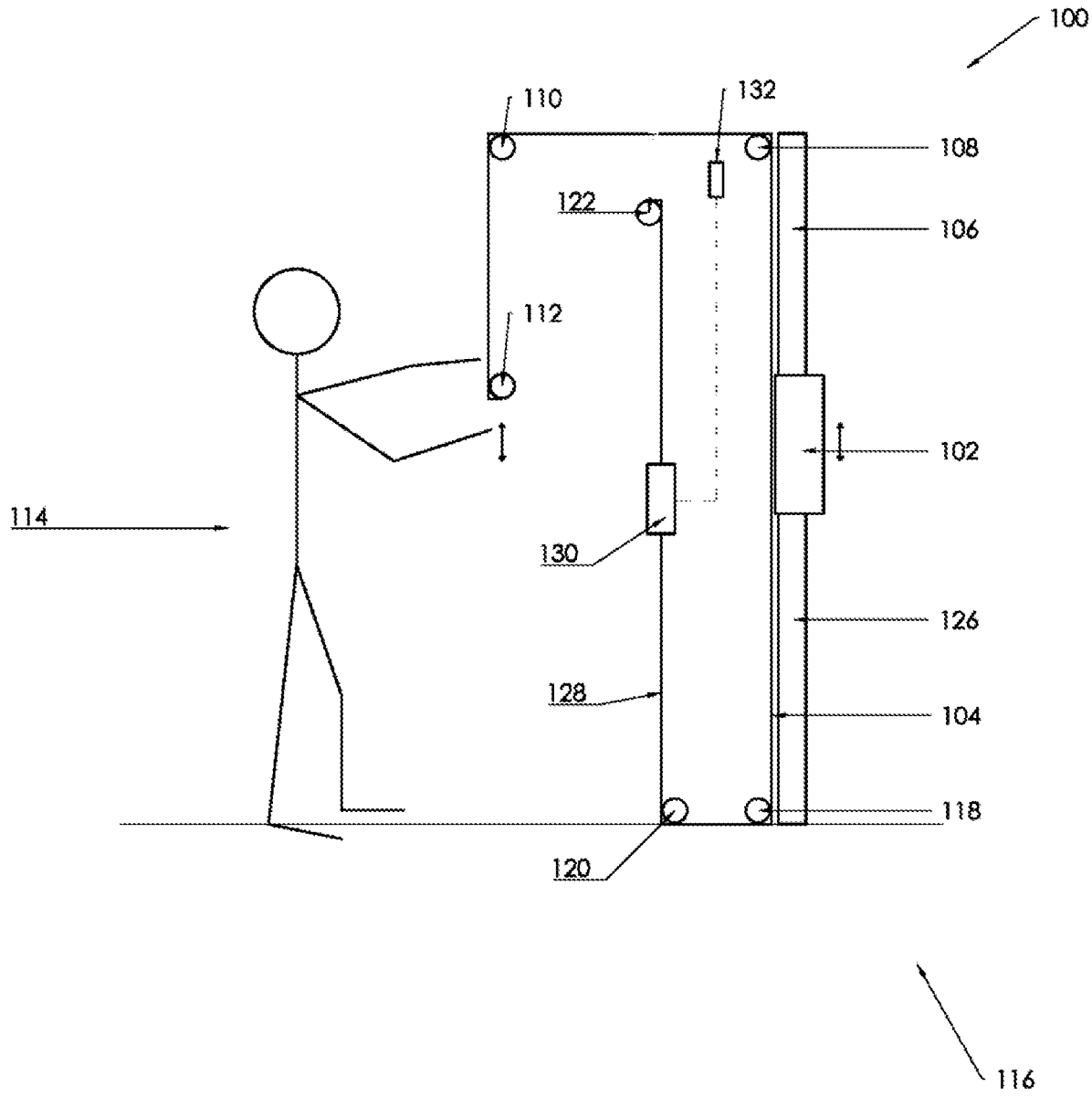

Figure 7

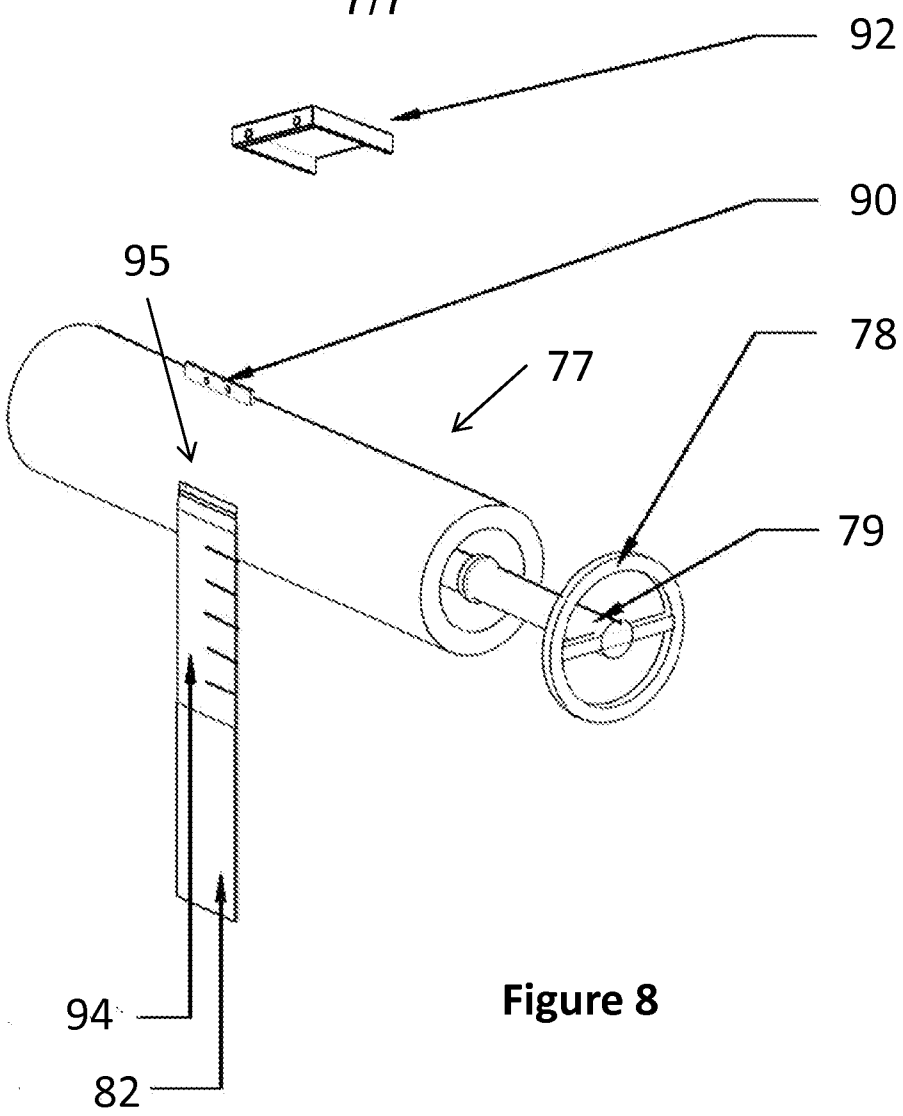

Figure 8

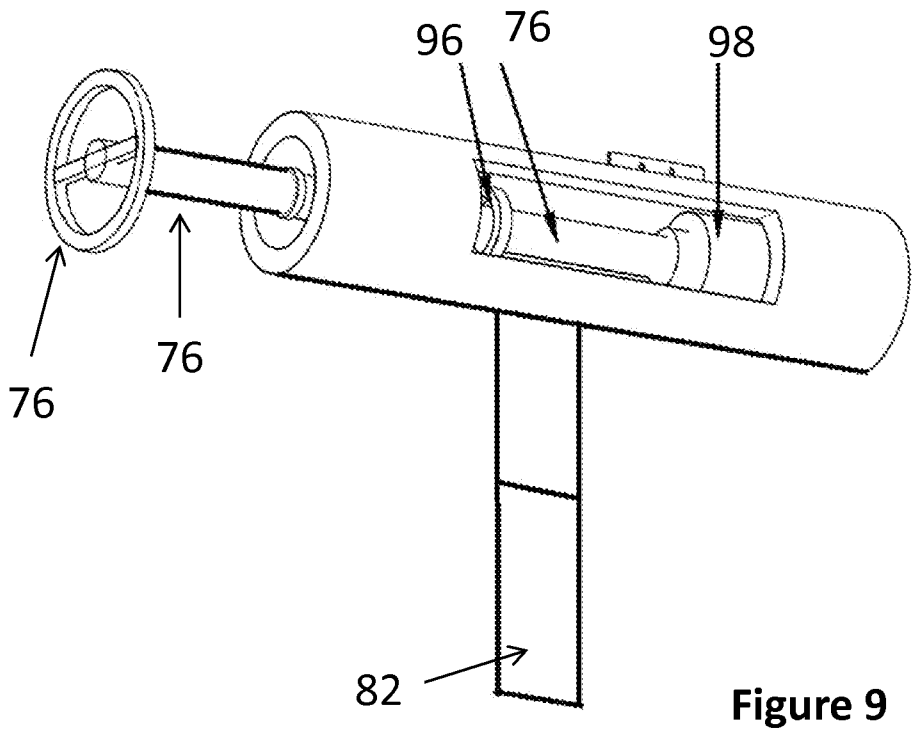

Figure 9