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(71) Applicant: **Gyroskeet Holding IVS**
8500 Grenå (DK)

(72) Inventor: **Larsen, Jens**
3230 Græsted (DK)

(74) Representative: **Weinrich, Søren Gert**
SGW Patent IVS
Hybenhaven 7
3060 Espergærde (DK)

(54) SPORTS SHOOTING TARGET AND CORRESPONDING LAUNCHING DEVICE, APPARATUS AND METHOD

(57) The invention relates to a sports shooting target made of a biodegradable material, the target being characterized by a rotational axis (L) and attachment means (3, 5) for releasable attachment to a launching device, where the target is provided with trajectory stabilizing means (7) that are configured to stabilize the trajectory of the target by gyro effect caused by rotation about said rotational axis (L) and propelling means that cause forward movement of the target due to the rotation about said rotational axis (L). Compared with prior art sports shooting targets the target according to the invention is very light weight, typically below 10 grams and made of a biodegradable material such as corn starch-based plastics, wood or other biological fiber materials. The invention further relates to a launching device configured to pick up the target, retain it during rotational acceleration of the target and release it, when a desired rotational speed of the target has been reached. The invention also relates to a launching apparatus and a method for launching sports shooting targets of the kind proposed by the invention.

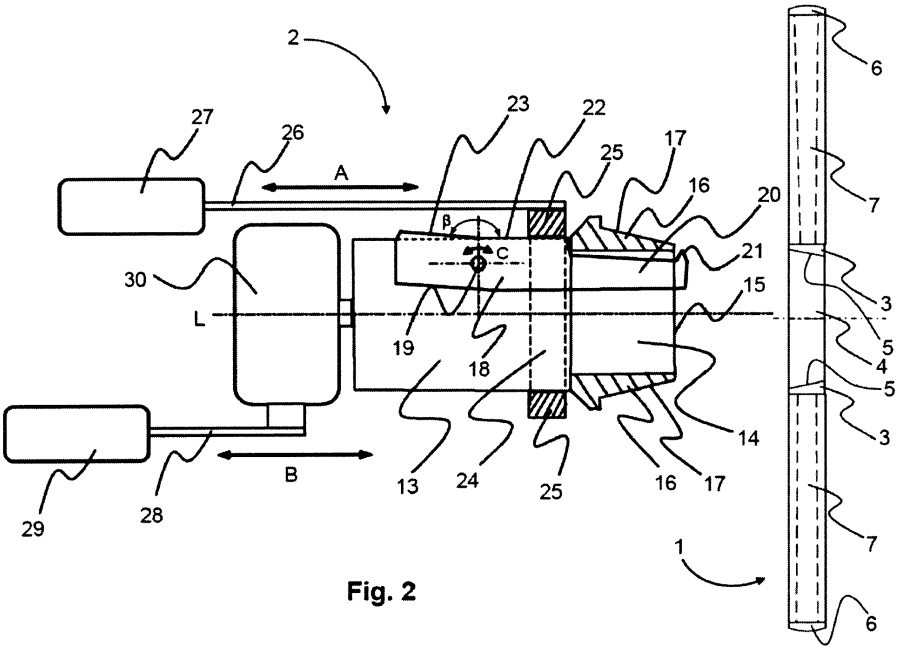

Fig. 2

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of sports shooting targets and apparatuses for launching such targets and more particularly to improvements of targets and apparatuses with the aim to reduce environmental hazards caused by the targets and to improving path/trajectory stability of targets after launching from launching apparatuses.

BACKGROUND OF THE INVENTION

[0002] Prior art sports shooting targets, such as clay pigeons, are made of limestone and a binding material, such as pitch, bitumen or another organic material and weighs typically about 105 to 110 grams. The binder materials may contain components that can pose a potential risk to the environment. The binder material may contain a mixture of different hydrocarbons called polycyclic aromatic hydrocarbons (PAH) and some of these are known to be toxic.

[0003] Prior art launching apparatuses comprise a throwing arm that can be rotated about a rotational axis and onto which a sports shooting target is provided from a supply container at a distance from the rotational axis. Longitudinally opposite the rotational axis, the throwing arm has a free end portion from which a target provided on the arm will be launched due to the centrifugal force exerted on the target by the rotation of the throwing arm. Traditional sports shooting targets are not provided with stabilizing means that act to stabilize the path or trajectory of the target after it has left the launching apparatus. The lack of stabilizing means in the prior art target may not pose a serious problem for targets of relatively heavy weights, but for very light weight targets, the trajectory will be rather unstable and unpredictable.

[0004] The use of traditional clay pigeons are prohibited at many locations in the world due to the risk of polluting the environment. Especially, in the vicinity of ground water drillings, the use of traditional clay pigeons are widely prohibited. There is a current tendency that the prohibition of the use of traditional clay pigeons may be generally implemented during the coming years. Hence there is a need to provide a replacement of the traditional clay pigeon, that solves the environmental issues, but still make traditional clay pigeon shooting possible, substantially without altering the behavior of the new kind of sports shooting target after launching from a lunching apparatus. The new kind of sports shooting target should thus be able to offer a hunter or sports shooter the same experience as the traditional type of clay pigeon does.

[0005] There is hence a need for a sports shooting target and corresponding launching apparatus and method that will solve both the environmental issues addressed above and provide a more stable and predictable trajectory of the target, or a trajectory that resembles that of a traditional clay pigeon.

OBJECTIVE OF THE PRESENT INVENTION

[0006] An objective of the present invention is to provide a light weight sports shooting target that despise its low weight has improved trajectory stability after launching.

[0007] A further objective of the present invention is to provide a sports shooting target that reduces or even entirely eliminates the risk of polluting the environments.

[0008] A further objective of the present invention is to provide a sports shooting target that is cheap to manufacture specifically much cheaper than traditional clay pigeons.

[0009] A further objective of the invention is to provide a very light weight sports shooting target, thereby rendering it possible to ship large quantities of targets throughout the world at a very low prize.

DISCLOSURE OF THE INVENTION

[0010] The above and further objects and advantages are according to a first aspect of the invention obtained by a sports shooting target according to the invention.

[0011] The present invention provides an environmentally advantageous alternative to traditional clay pigeons. The sports shooting targets of the invention moves substantially in the same manner as traditional clay pigeons, such that a sports shooter will have substantially the same experience and pleasure when using the sports shooting targets of the invention as when using traditional clay pigeons.

[0012] Due to their low weight the sports shooting targets of the invention can be manufactured at a central location, where they can be cheaply manufactured, and distributed throughout the world from this centralized location.

[0013] An important feature of the sports shooting target according to the first aspect of the present invention is that its weight is very much reduced compared to traditional sports shooting targets. The weight of such prior art targets is typically in the range 100 to 110 grams, whereas the sports shooting target according to the present invention typically weighs less than 10 grams, typically in the range 6 to 8 grams.

[0014] Another important feature of the sports shooting target according to the first aspect of the present invention is that it is configured to obtain maximum directional stability, such that it - despise the very low weight of the target - is able to follow a staple trajectory in space after being launched from a launching apparatus. According to the invention, this stabilizing effect is obtained by gyroscopic means.

[0015] In an embodiment of the sports shooting target according to the invention a combined gyrostabilizing effect and a forward propelling effect is obtained by con-

figuring the target as a circular object that after launching rotates about its rotational axis - whereby the gyrostabilizing effect is obtained - and where the circular object is provided with fan means that, when rotating about the rotational axis of the target, propels the target in a desired forward direction. Different embodiments of targets according to the invention are shown and described below.

[0016] Still another important feature of the sports shooting target according to the first aspect of the present invention is that it is made of a biodegradable material in order to reduce or eliminate environmental hazards.

[0017] According to the first aspect of the present invention, there is provided a sports shooting target made of a biodegradable material, the target having a rotational axis (z) and attachment means for releasable attachment to a launching device, and where the target is provided with trajectory stabilizing means that are configured to stabilize the trajectory of the target by gyro effect caused by rotation about the rotational axis (z) and where the target is provided with propelling means that cause forward movement of the target along its trajectory due to the rotation about the rotational axis (z).

[0018] In an embodiment of the first aspect, the weight of the target is below 50 grams, preferably below 20 grams and still more preferably below 10 grams. Typically, the weight of the target is as low as 6 to 8 grams.

[0019] In an embodiment of the first aspect, the biodegradable material is corn starch-based plastics, wood or other biological fiber materials.

[0020] In an embodiment of the first aspect, the stabilizing means is comprises a fan provided with fan blades that rotates in unison with the target and, when rotated, both provides said stabilizing gyro effect and said forward propulsion of the target along a chosen trajectory.

[0021] In an embodiment of the first aspect, the target comprises a hub portion configured for releasable attachment to a portion of a launching device, which portion of the launching device, when the target is attached to it, can rotate the target and release it from the launching device, when a desired terminal rotational speed has been reached.

[0022] In an embodiment of the first aspect, the hub portion is provided with a conical inner circumferential surface of the hub portion facilitating release of the target from the portion of the launching device.

[0023] In an embodiment of the first aspect, the fan blades extend radially from the hub portion to an outer ring member, which outer ring member defines the outer circumferential portion of the target.

[0024] In an embodiment of the first aspect, the fan blades have upper and lower surfaces (Su, S_L) that are inclined an angle relative to the plane (x, y) of the target.

[0025] In preferred embodiments of the first aspect, the thickness t_T of the target is much less than the diameter d_T of the target, where the target thus forms a substantially cylindrical body comprising a hub portion, fan blades and an outer ring member with a height of the cylinder being much less that the diameter of the cylinder. The cylindrical body extends in or parallel to the (x, y) plane that is substantially perpendicular to the axis of rotation z of the target.

[0026] The sports shooting targets according to the first aspect of the invention flies through the air after launching with their largest area substantially facing the shooter, whereas a traditional clay pigeon flies substantially as a disk (a Frisbee) with a much smaller area facing the shooter. Hence, the new target will be more visible to the shooter, which may even eliminate the need of coloring the target (traditional clay pigeons are often provided with an orange color). As a coloring agent may comprise environmentally hazardous materials, the increased visibility of the sports shooting targets according to the first aspect of the invention can be regarded as a further advantage.

[0027] A traditional clay pigeon disintegrates entirely after being hit and distributes potentially environmentally hazardous material over the ground in a manner that makes it impossible to clean the ground after a shooting session. Contrary to this, the sports shooting target according to the first aspect of the invention fragments into larger pieces that can subsequently be picked up and removed and for instance incinerated in a CO_2-friendly manner.

[0028] In preferred embodiments, the target of the invention has its center of gravity on the rotational axis of the target. Specifically, the target maybe symmetrical about an axis of symmetry that coincides with the rotational axis.

[0029] Two non-limiting embodiments of a spots shooting target according to the first aspect of the invention will be described in detail below.

[0030] The above and further objects and advantages are according to a second aspect of the invention obtained by a launching device for a sports shooting target, the launching device comprising a rotatable portion comprising a body portion characterized by a longitudinal axis L, which body portion is at one longitudinal end attached to a rotation generator, such as an electro motor, configured to rotate the body portion about the longitudinal axis L, where the body portion at the other longitudinal end is connected to a nose section configured to rotate in unison with the body portion and being configured such that the nose section corresponds to attachment means provided on the target, where the rotatable portion of the launching device is further provided with releasable retaining means configured to retain a target to the nose section and to release the target from the nose section after the nose section has been accelerated to a desired rotational speed about the longitudinal axis L.

[0031] In an embodiment of the second aspect, the body portion is substantially cylindrical and comprises a first cylindrical section and a second cylindrical section, where the nose section is a tubular body with an inner diameter d that substantially corresponds to the diameter of the outer circumferential surface of the second cylindrical section, such that the nose section can be placed

on the second cylindrical section and rotate in unison with it, and where the body portion in its outer circumferential surface is provided with longitudinally extending recesses or channels, each formed to accommodate a retainer member that is configured to be able to undergo a movement from a closed or retaining position, in which it retains a target to the nose section to an open or releasing position, in which it releases the target from attachment to the nose section or vice versa.

[0032] In an embodiment of the second aspect, the device is provided with first activator means configured to move the retainer member from said open to said closed position or vice versa.

[0033] In an embodiment of the second aspect, the device is provided with second activator means configured to move the rotatable portion over a given distance in the direction of the longitudinal axis L between a position, in which a target can be pricked up by the launching device and another position along the longitudinal axis L.

[0034] Example embodiments of activator means are described in the detailed description of the invention, but it is understood that other embodiments of suitable activator means may be used and that such embodiments would also fall within the scope of the present invention.

[0035] In an embodiment of the second aspect, the retainer member is provided with two sub-surfaces and the first activator means is provided with a tubular member configured to undergo longitudinal displacement on the outer circumferential surface of the body portion of the rotatable portion of the launching device in contact with at least one of the sub-surfaces, such that when the tubular member is in contact with a first sub-surface, the retainer member is brought to its open position, and when the tubular member is in contact with a second sub-surface the retainer member is brought to its closed position.

[0036] The above and further objects and advantages are according to a third aspect of the invention obtained by a launching apparatus for launching sports shooting targets, where the apparatus comprises at least one of the launching devices according to the second aspect of the invention, where the launching apparatus comprises holder legs attached to a housing of the apparatus and configured such that the at least one launching device can be tilted an angle α relative to the apparatus, where the apparatus is provided with at least one supply container for accommodating sports shooting targets according to the first aspect of the invention, where the supply containers are aligned with a corresponding launching device such that this launching device can pick up a target from the supply container, and where the launching device can be tilted and angle α from a pickup position aligned with a corresponding supply container to a launching position, where the picked up target is ready to be launched from the apparatus.

[0037] The apparatus according to the third aspect of the invention may be incorporated in a distributed system of users that may even extend worldwide, which system may comprise means configured to monitor each individual user's store of targets and automatically provide the user with new targets from a central store of targets, before he runs out of targets. Also, the monitoring may cover the function of the launching apparatus, such that the user may be warned of a pending or actual malfunction of the apparatus and be able to replace it with a new one. This system may be established via the Internet or any other suitable wired or wireless communication.

[0038] The above and further objects and advantages are according to a fourth aspect of the invention obtained by the launching device according to the second aspect provided with a handle portion comprising a trigger configured to launch a target according to the first aspect, when the trigger is activated.

[0039] The above and further objects and advantages are according to a fifth aspect of the invention obtained by a method of launching a sports shooting target, the method comprising:

- providing a sports shooting target according to the first aspect of the invention;
- accelerating the sports shooting target about its rotational axis until a predetermined terminal rotational speed of the target about the rotational axis is reached;
- directing said rotational axis in a desired direction (E) relative to the surroundings; and
- releasing the target;

whereby the target will move along a trajectory in space, stabilized by gyro effect caused by rotation about the rotational axis of the target and propelled along said trajectory by the rotation about the rotational axis of the target.

[0040] The above and further objects and advantages are according to a sixth aspect of the invention obtained by the use of rotating a sports shooting target about a rotational axis of the target to provide a combined trajectory stabilizing effect and propulsion of the target along the trajectory.

[0041] In an embodiment of the sixth aspect the above mentioned combined trajectory stabilizing effect and propulsion of the target is obtained by providing the target with a rotor or fan arrangement that, when the target is rotated about a rotational axis both exerts a propulsive effect on the target and also stabilizes the target by the gyro effect caused by the rotation of the target. A specific implementation of this combined mechanism is described in detail in the detailed description of the invention.

[0042] An important advantage of the invention is that it makes it possible to apply a very light weight target with a weight typically below 10 grams whereas traditional targets weigh ten times more, typically in the order 100 to 110 grams. The targets according to the teachings of the invention are made of a biodegradable material witch both in itself and to man even larger extend minimizes any risk of polluting the environments as traditional tar-

gets often do, due to their contents of PAH compositions in the target.

[0043] Another important advantage of the invention is that it provides a method and means for stabilizing the trajectory of the target, which becomes the more important due to the very low weight of the target. In order to obtain optimal stabilizing gyro effect, the target is accelerated to a very high rotational speed (for instance up to 20.000 rpm), which, due to the propelling mechanism incorporated in the target will also give a very high initial linear speed of the target, when launched from a launching device according to the invention. Thus, an initial linear speed of more than 100 km/h and a range of more than 100 meters have been obtained with a prototype implementation of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0044] Further benefits and advantages of the present invention will become apparent after reading the detailed description of non-limiting exemplary embodiments of the invention in conjunction with the accompanying drawings, wherein

Figure 1 (a) shows a schematic plane view of a sports shooting target according to a first embodiment of the first aspect of the present invention;

Figure 1 (b) shows a schematic side view of the sports shooting target according to the embodiment shown in figure 1(a);

Figure 1(c) shows a schematic plane view of a sports shooting target according to a second embodiment of the first aspect of the present invention;

Figure 1 (d) shows a schematic side view of a sports shooting target according to an embodiment of the first aspect of the invention;

Figure 2 shows a schematic representation of a launching device configured to launch the sports shooting target according to the invention;

Figure 3 shows a schematic perspective exploded view of details of the pickup and launching portion of an embodiment of the launching device used in launching apparatuses according to the invention;

Figure 4(a) and (b) show a schematic view of the cylindrical body portion, the nose section and the tubular member together with a schematic representation of a target according to an embodiment of the first aspect for illustrating of the pickup procedure carried out by an embodiment of the launching device according to the invention.

Figure 5 shows a schematic front view of an embodiment of a launching apparatus according to the invention comprising two separate launching devices and corresponding storage containers for accommodating a plurality of sports shooting targets according to the invention;

Figure 6 shows a schematic side view of the embodiment of a launching apparatus according to the invention shown in figure 3 where one of the launching devices is in a pickup position in proximity to the corresponding storage container and the other launching device is in an inclined position ready to launch a sports shooting target picked up from the corresponding storage container;

Figure 7 shows a schematic partly cut-away side view of an embodiment of a launching device according to the second aspect of the invention comprising an embodiment of a servo motor system configured for controlling the functions of the launching device;

Figure 8 shows a hand-held embodiment of a launching device according to the second aspect of the invention: and

Figure 9 shows a view of a detail of an embodiment of the launching device according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0045] Referring to figure 1(a) there is shown a schematic representation of a sports shooting target 1 according to an embodiment of the first aspect of the present invention. The target 1 has a wheel-shaped configuration comprising a central tubular hub portion 3 defining an inner space 4 extending through the target 1, i.e. extending in the z-direction perpendicular to the plane of the drawing. Extending radially from the hub portion 3 the target is in this embodiment provided with three fan blades 7, each having an upper surface Su and a corresponding lower surface S_L (see also figure 1(b)). In the shown embodiment, the upper and lower surfaces are inclined an angle relative to the xy-plane of the target. The inclination angle can be substantially equal on the upper and lower surface, but in an embodiment of the target different angles of inclination may alternatively be applied. Also, the upper and lower surfaces of the fan blades 7 can be substantially planar or curved as desired. Between adjacent fan blades 7 there is an open space 8 that extends through the target and makes it possible for air to flow through the target via these spaces. Each fan blade 7 is provided with opposing side edges 9 and 10 that in the embodiment shown in figure 1 (a) are curved.

[0046] In preferred embodiments, the thickness t_T of the target is much less than the diameter d_T of the target, where the target thus forms a substantially cylindrical

body comprising the hub portion (3), the fan blades (7) and the outer ring member (6) with a height of the cylinder being much less that the diameter of the cylinder. The cylindrical body extends in or parallel to the (x, y) plane that is substantially perpendicular to the axis of rotation z of the target.

[0047] At the radially distal ends of the fan blades 7 the sports shooting target according to the embodiment shown in figure 1 (a) is provided with an outer ring member 6 providing mechanical stability and rigidity to the target. It is important that the attachment surface S_R between the individual fan blade 7 and the ring member 6 is large in order to ensure a reliable attachment of the fan blade to the ring member, whereas the attachment surface S_H between the fan blade and the hub 3 of the target can be made smaller without reducing the robustness of the target. If the attachment surface S_R is not sufficiently large there is a risk of the target disintegrating during rotation.

[0048] In the embodiment shown in figure 1(a), the target is provided with three fan blades 7, but it is understood that other numbers of fan blades may be used without departing from the scope of the invention. It is important, though, that the number of fan blades - and their dimensions - are chosen such that sufficient free space 8 is left between the blades and through the target to ensure a sufficient air flow through the target.

[0049] Referring to figure 1(b) there is shown a schematic cross sectional view of the target according to the embodiment shown in figure 1(a). Figure 1(b) shows the cross sectional shape of the space 4 of the hub portion 3 of the target, which space 4 is bounded by an inclined circumferential side surface 5 facilitating release of the target from a launching device to be described in detail below.

[0050] Referring to figure 1(c) there is shown a schematic plane view of a sports shooting target according to a second embodiment of the first aspect of the present invention. In this embodiment the upper and lower surfaces Su' and S_L' respectively, are substantially rectangular, either curved or substantially planar. As in the first embodiment shown in figure 1(a), the is used three fan blades 7' in the second embodiment, although different numbers of fan blades could be used without departing from the scope of the invention.

[0051] Referring to figure 1(d) there is shown a schematic side view of a sports shooting target according to an embodiment of the first aspect of the invention in which view the upper surface Su and the lower surface S_L of the fan blades 7 are more clearly shown.

[0052] It is understood that other fan blade configurations and geometrical properties than those shown in figures 1(a) through (d) can be used in the first aspect of the invention as deemed desirable in order to optimize flying characteristics (for instance trajectory stability and range) of the target. Such modifications of the fan blades are also regarded to fall within the scope of protection of the invention.

[0053] Referring to figure 2 there is shown a schematic representation of an example embodiment of a launching device according to the invention, generally designated by reference numeral 2, configured to launch the sports shooting target according to the first aspect. Also shown in figure 2 is a cross sectional view of an embodiment of a sports shooting target according to the first aspect of the invention generally designated by reference numeral 1. This embodiment of a sports shooting target could for instance be the one described in connection with figure 1(a) above, although other embodiments of the sports shooting target according to the first aspect of the invention may also be used, provided they are configured for releasable attachment to the launching portion of the launching device.

[0054] The embodiment of a launching device according to the second aspect of the invention shown in figure 2 comprises basically the following elements:

(1) A pickup and launching portion comprising a cylindrical body portion 13 and nose section 14 (shown in cross section in figure 2 as indicated by reference numeral 16) and fixedly attached to the cylindrical body portion 13, such that the cylindrical body portion 13 and the nose section 14 can rotate in unison about a longitudinal rotational axis L through the launching device 2.

(2) A rotation generator 30, such as an electrical motor, coupled to the pickup and launching portion and configured to rotate the pickup and launching portion about the rotational axis L.

(3) A first linear activation mechanism comprising a tubular member 24 configured to be able to undergo a displacement over the outer circumferential surface of the cylindrical body portion 13 when activated by an activator 27 that may be coupled to the tubular member 24 through a rod 26. This displacement is in figure 2 indicated by arrow A.

(4) A second linear activation mechanism comprising an activator 29 coupled to the pickup and launching portion for displacing this portion linearly in the direction of the longitudinal axis L as indicated by arrow B in figure 2. In figure 2 the activator 29 is coupled to the motor 30 via a rod 28, but it is understood that the activator 29 could alternatively be coupled to the cylindrical body portion 13.

[0055] As linear activator mechanisms 26, 27, 28, 29 any suitable activator designs and principles could be used. A non-limiting example of electro-mechanical designs is described in the following, but many alternatives would be conceivable by a person skilled in the art.

[0056] In the following a detailed embodiment of the pickup and launching portion according to the invention is described that focuses on those elements that are of

main importance for the functioning of the launching device according to the second aspect of the invention.

[0057] A detailed description of an embodiment of the pickup and launching portion is given in the following with reference to figures 2, 3 and 4.

[0058] As appears from figure 2, the pickup and launching portion is provided with a retainer member generally designated by reference numeral 18 and attached to the cylindrical body portion 13 such that the retainer member 18 can undergo a tilting movement as indicated by arrow C in figure 2. In the embodiment shown in figure 2, the tilting movement takes place about a tilt axle 19, but it is understood that other configurations facilitating a tilting movement could alternatively be used without departing from the scope of the invention. It is preferable that the retainer member is provided with means that prevent a general outward displacement (radially away from the longitudinal axis L) caused by the centrifugal force acting on the retainer member, when the body portion 13 is rotating about the longitudinal axis L. The retainer member 18 will be exposed to a quite large centrifugal force, as the maximum rotational speed of the body portion 13 will be very high, for instance in the order 20.000 rpm. Providing a rotational axle 19 is one means of solving this problem.

[0059] The retainer member 18 comprises a lateral surface provided with two sub-surfaces 22 and 23 that are inclined an angle β relative to each other.

[0060] The retainer member 18 is at one longitudinal end provided with an extension portion 20 that extends through the nose section 14 of the pickup and launching portion. Longitudinally outside the end plane 15 of the nose section 14, the extension portion 20 is provided with retaining projection or tooth 21 that are configured to be able to retain a sports shooting target 1 to the nose section 14 as described in detail below.

[0061] The retainer member 18 is brought from an open (receiving) position, where a target 1 can be inserted on the nose section 14, to a closed (retaining) position, where the target 1 is fixed to the nose section 14, such that it is forced to undergo rotation in unison with the nose section, be means of the tubular member 24 described above. Thus, in the position of the tubular member 24 shown in figure 2, the inner circumferential surface of the tubular member 24 urges the sub-surface 22 of the retainer member 18 inwardly towards the longitudinal axis L to the position shown in figure 2, thereby obtaining the open position described above. When the tubular member 24 is displaced towards the motor 30 by the activating means 27, the inner circumferential surface of the tubular member 24 urges sub-surface 23 inwardly towards the longitudinal axis L and thereby tilts (arrow C) the retaining member 18 to its closed position as for instance shown in figure 4(b), in which position it retains the target 1 to the nose section 14.

[0062] The function of the launching device according to the embodiment shown in figure 2 is basically subdivided in the following four steps, in which it is assumed that initially the retainer member 18 is brought into its open (receiving) position (as shown in figures 2 and 4(a)):

Step 1: Activator 29 displaces the pickup and launching portion towards and into contact with the target 1, such that the inclined surface 5 of the hub 3 of the target 1 rests on the corresponding inclined outer circumferential surface 17 of the nose section 14. The retaining projections 21 are now pushed entirely through the open region 4 of the hub 3 of the target 1 as shown in figure 4(a).

Step 2: Activator 27 displaces the tubular member 24 towards the motor 30 where the inner circumferential surface of the tubular member 24 urges sub-surface 23 of the retainer member 18 inwardly towards the longitudinal axis L. The retainer member 18 tilts to its closed (retaining) position as shown in figure 4(b) thereby locking the target 1 to the nose section 14 of the pickup and launching portion. It is understood that this step requires the launching device being properly aligned with a supply container (such as 37 in figures 5 and 6 to be described below) that contains one or more targets according to the first aspect of the invention.

Step 3: The longitudinal axis L of the pickup and launching device is placed in a desired direction relative to the surroundings as indicated by arrow E in figure 6.

Step 4: The motor 30 starts rotation the pickup and launching portion about the longitudinal rotational axis L and accelerates thereby the target 1 to a desired terminal rotational speed, at which the target 1 is ready to be launched in the direction of arrow E (c.f. figure 6).

[0063] It is understood that steps 3 and 4 may be reversed or carried out more or less simultaneously, if desired.

[0064] Step 5: The launching device releases the target by displacing the tubular member 24 to its position proximate to the nose section 14. This is accomplished by means of the activator 27.

[0065] Step 6: The launching operation either terminates after the target 1 has been released from the pickup and launching device in step 5, or the launching device returns to the position facing the storage container and a new target is picked up from the container.

[0066] Referring to figure 3 there is shown a schematic perspective exploded view of details of the pickup and launching portion of an embodiment of the launching device according to the second aspect of the invention. Figure 3 shows the cylindrical body portion 13, the nose section 14 and the tubular member 24 in an exploded view representation along the longitudinal axis L. The cylindrical body portion 13 comprises two sections 13'

and 13" of different diameter. The diameter of section 13" substantially corresponds to the diameter d of the inner circumferential surface of the nose section 14, such that the nose section 14 can be positioned on the small diameter section 13" of the cylindrical body portion 13. In the respective outer circumferential surfaces of the two sections 13' and 13" there are provided a number of longitudinally extending recesses or channels 31 each configured to accommodate a retainer member 18 as described above. A tilt axle 19 for the respective retainer member 18 may be passed through the recesses 31 as schematically shown in figure 3.

[0067] Referring to figures 4(a) and (b) there is shown a schematic view of the cylindrical body portion 13, the nose section 14 and the tubular member 24 together with a schematic representation of a target 1 according to an embodiment of the first aspect for illustrating of the pickup procedure carried out by an embodiment of the launching device according to the invention.

[0068] In figure 4(a), the launching device is positioned below and adjacent to a target 1 accommodated in a supply container (not shown in figure 4(a)). The retainer member 18 is in its open position with the retaining projection 21 displaced radially inwardly towards the longitudinal axis of the device, i.e. in a position where the launching device is ready to pick-up a target 1.

[0069] In figure 4(b), the launching device has been moved towards the target 1 and has made contact with it. The retaining projection 21 is now in its retaining position, i.e. with the retaining projection 21 displaced radially outward away from the longitudinal axis, and thus holding the target 1 in a fixed position relative to the rotatable portions of the launching device, thereby ready to undergo rotational acceleration to the required terminal rotational speed needed to launch the target 1.

[0070] Referring to figure 5 there is shown a schematic front view of an embodiment of a launching apparatus according to the third aspect of the invention generally designated by reference numeral 33 comprising two separate launching devices 35 and 36, respectively, and corresponding storage containers 38 for accommodating a plurality of sports shooting targets according to the invention. The launching devices according to this embodiment of the second aspect of the invention is of a cylindrical (and telescopic) configuration comprising a second tubular member 39 attached to a third tubular member 40 that can be displaced longitudinally over the outer circumferential surface of a fourth tubular member 50 as described in detail in connection with figure 7.

[0071] Referring to figure 6 there is shown a schematic side view of the embodiment of a launching apparatus 33 according to the invention shown in figure 5 where one of the launching devices 35 is in a pickup position in proximity to the corresponding storage container 38 and the other launching device 36 is in an inclined position (indicated by the angle α) in which position it is ready to launch a sports shooting target 1 picked up from the corresponding storage container in the direction indicated by the arrow E.

[0072] The launching apparatus according to the third aspect of the invention can be controlled to obtain a number of different shooting schemes, such as double shooting with a desired shooting interval, for instance 4 seconds.

[0073] Referring to figure 7 there is shown schematic representation of a practical implementation of an embodiment of a launching device according to the second aspect of the invention. The various elements that have been described previously are designated by the reference numerals used in figures 1 through 6 and their function and other characteristics will not be described further. Only elements that are important for the functioning of the device are designated by reference numerals and described below.

[0074] Figure 7 shows the motor 30 that is configured and geared to rotate the cylindrical body portion 13 and the nose section 14 as described in detail above. Figure 7 also shows the tubular member 24 that surrounds the cylindrical body portion 13 and the retainer member 18 with its retaining projection 21. The tubular member 24 is fixedly attached to a second tubular member 39 that forms the longitudinal top portion of a third tubular member 40. The third tubular member 40 has an inner diameter that allows it is undergo a longitudinal movement over the outer circumferential surface of a fourth tubular member 50 that forms the main housing of the launching device. The launching device according to this embodiment of the second aspect of the invention is thus of a cylindrical telescopic configuration as it clearly appears from figures 5 and 6.

[0075] Attached to and inside the third tubular member 40 there is provided a first lateral beam or plate 41 that is provided with a laterally extending through groove or recess 42 dimensioned to accommodate a cylindrical tap 43 that is mounted for rotation with the rotational axle of a first servo motor 44 (as schematically indicated by the three positions I, II and III of the tap member.

[0076] In position I of the tap 43, the tubular member 24 is displaced as far as possible along the longitudinal axis L towards the nose section 14 resulting in the retainer member 18 being in its open position as shown. When the first servo motor 44 rotates the tap 43 in the direction towards the second and third position II and III respectively, the first lateral beam 41 is displaced longitudinally away from the nose section 14, thus displacing the tubular member 24 to a position furthest away from the nose section 14, whereby the retainer member 18 is brought to its closed (retaining) position as described above in connection with figures 2, 3 and 4.

[0077] The first servo motor 44, the motor 30, the cylindrical body portion 13 and the nose section 13 are all attached to the fourth tubular member 50 that forms the main housing of the launching device.

[0078] Also attached to the fourth tubular member is a second servo motor 45, to the rotational axle of which there is connected a cylindrical tab 46 in the same man-

ner as in connection with tap 43 and motor 44 described above. Laterally extending through the inner space of the fourth tubular member 50 and attached to this there is provided a second lateral beam or plate 47 that is provided with a through groove or recess 48 substantially corresponding to the first lateral beam or plate 41 described above.

[0079] In position IV of the tap 46, the fourth tubular member 50 is displaced as far as possible along the longitudinal axis L towards a supply container 38 (not shown in figure 7 but in figures 5 and 6). When the second servo motor 45 rotates the tap 46 in the direction towards the second and third position V and VI respectively, the second lateral beam 47 is displaced longitudinally away from the supply container 38, thereby releasing a target picked up from the supply container 38 and bringing it to a position free from the supply container 38.

[0080] Referring to figure 8 there is shown a hand-held embodiment of a launching device 2 according to the second aspect of the invention comprising a handle portion 51 with a trigger 53 for launching the target. The handle portion 51 may contain the various control circuitry necessary to control the function of the launching device and batteries for providing power to the motors and electronics of the device. The four basic functions of the launching device may be controlled by appropriate user-accessible means on the handle portion 51. For instance, the handle portion 51 may be provided with a user-operable switch 52 that can shift between three positions indicated by reference numeral 54: "O" indication the open (receiving) position of the retainer member 18 in which position a target can be placed on the nose section 14, "R" indication the closed (retaining) position of the retainer member 18, in which the target can be rotationally accelerated to its desired rotational speed, and "A" indication a position in which rotational acceleration of the target takes place. After the desired rotational speed of the target has been reached, activation of the trigger 53 launches the target from the launching device.

[0081] Referring to figure 9 there is shown a view of a detail of an embodiment of the launching device according to the invention. In this embodiment the nose section 14 is provided with an end cap 56 with an inclined (conical) outer circumferential surface 57, the inclination of which may substantially correspond to the inclination of the outer (conical) circumferential surface 55 of the nose section 14. Provided in the end cap 56 there are recesses 58 (one for each retainer member 18) that accommodates the pointed end portion of the retainer member with the pointed tooth 59 that in the closed state of the retainer member holds the target in a fixed position on the launching device. The tooth 59 has a lower surface 60, and it has been established that the inclination angle γ of this surface should preferably (but not necessarily) be of the order 45 degrees bin order to ensure the best grip on the target and preventing the target from destruction during use of the launching device.

[0082] The end cap 56 serves the important function to protect the adjacent surface of the hub portion of the target from being damaged by the pointed teeth of the retainer members when the target is released from the nose section. Thus, when the retainer member is its open position, the pointed end of the tooth 59 is retracted to a position entirely within the end cap, thereby preventing any damage to the hub portion of the target, when the target is launched from the nose section.

[0083] Although the invention has been explained in relation to the embodiments described above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

LIST OF REFERENCE NUMBERS AND SIGNS

[0084]

1	Sports shooting target
2	Pickup and launching device
3	Hub portion of target
4	Inner space of hub portion
5	Inclined circumferential side surface of inner space of hub portion
6	Outer ring member of target
7	Fan blade of target
8	Open space between adjacent fan blades
9	Side edge of fan blade
10	Side edge of fan blade
11	Side edge of fan blade
12	Side edge of fan blade
13	Cylindrical body portion
14	Nose section
15	End plane of nose section
16	Cross section of nose section
17	Inclined outer circumferential surface of nose section
18	Retainer member
19	Tilt axle of retainer member
20	Extension portion of retainer member
21	Retaining projection or tooth
22	Sub-surface of retainer member
23	Sub-surface of retainer member
24	Tubular member
25	Cross section through tubular member
26	Rod
27	Activator
28	Rod
29	Activator
30	Rotation generator such as electrical motor
31	Recess or channel for accommodating retainer member
32	Upper surface portion of hub portion of target
33	Launching apparatus
34	Housing of launching apparatus

35 First launching device of launching apparatus
36 Second launching device of launching apparatus
37 Holder leg for launching device
38 Supply container for accommodating targets
39 Second tubular member
40 Third tubular member
41 First lateral beam or plate
42 Through groove or recess in first lateral beam or plate
43 Cylindrical tap
44 First servo motor
45 Second servo motor
46 Cylindrical tap
47 Second lateral beam or plate
48 Through groove or recess in second lateral beam or plate
49 Attachment member for 47 to fourth tubular member
50 Fourth tubular member (main housing of the launching device)
51 Handle portion
52 User-operable switch on handle portion
53 Trigger
54 Three operative settings on handle portion
55 Inclined (conical) outer circumferential surface of nose section
56 Conical end cap for nose section
57 Inclined (conical) outer circumferential surface of end cap
58 Recess in end cap
59 Pointed tooth of retainer member
60 Inclined lower surface of tooth

Claims

1. A sports shooting target made of a biodegradable material, the target having by a rotational axis (z) and attachment means (3, 5, 32) for releasable attachment to a launching device, where the target is provided with trajectory stabilizing means (7, 7') that are configured to stabilize the trajectory of the target by gyro effect caused by rotation about said rotational axis (z) and propelling means that cause forward movement of the target along its trajectory due to the rotation about said rotational axis (z).

2. A sports shooting target according to claim 1, where the weight of the target (1, 1') is below 50 grams, preferably below 20 grams and still more preferably below 10 grams.

3. A sports shooting target according to claim 1 or 2, where said biodegradable material is corn starch-based plastics, wood or other biological fiber materials.

4. A sports shooting target according to claim 1, 2 or 3, where said stabilizing means (7, 7') is comprises a fan comprising fan blades (7, 7') that rotates in unison with the target and, when rotated, both provides said stabilizing gyro effect and said forward propulsion of the target along a chosen trajectory.

5. A sports shooting target according to any of the preceding claims comprising a hub portion (3) configured for releasable attachment to a portion (14) of a launching device, which portion of the launching device, when the target is attached to it, can rotate said target and release it from the launching device, when a desired terminal rotational speed has been reached.

6. A sports shooting target according to claim 5, where said hub portion (3) is provided with a conical inner circumferential surface (5) of the hub portion (3) facilitating release of the target from said portion (14) of the launching device.

7. A sports shooting target according to any of the preceding claims 4 to 6, where said fan blades (7, 7') extend radially from said hub portion (3) to an outer ring member (6), which outer ring member (6) defines the outer circumferential portion of the target.

8. A sports shooting target according to any of the preceding claims 4 to 6, where said fan blades (7, 7') have upper and lower surfaces (S_U, S_L) that are inclined an angle relative to the plane (x, y) of the target.

9. A launching device for a sports shooting target, the device comprising a rotatable portion comprising a body portion (13) **characterized by** a longitudinal axis (L) and being at one longitudinal end attached to a rotation generator (30) configured to rotate the body portion (13) about the longitudinal axis (L), where the body portion (13) at the other longitudinal end is connected to a nose section (14) configured to rotate with the body portion (13) and being configured such that it corresponds to said attachment means (3, 5, 32) on said target (1), where the rotatable portion of the launching device is further provided with releasable retaining means configured to retain a target (1) to the nose section (14) and to release the target (1) from the nose section (14) after providing the nose section (14) with a desired rotational speed about the longitudinal axis (L).

10. A launching device according to claim 9, where said body portion (13) is substantially cylindrical and comprises a first cylindrical section (13') and a second cylindrical section (13"), and where said nose section (14) is a tubular body with an inner diameter (d) that substantially corresponds to the diameter of the outer circumferential surface of the second cylindrical

section (13") such that the nose section (14) can be placed on the second cylindrical section (13") and rotate with it, and where the body portion (13) in its outer circumferential surface is provided with longitudinally extending recesses or channels (31) each formed to accommodate a retainer member (18) that is configured to be able to undergo a movement from a closed or retaining position, in which it retains a target (1) to the nose section (14) to an open or releasing position, in which it releases the target (1) from attachment to the nose section (14) or vice versa.

11. A launching device according to claim 10, where the device is provided with first activator means (24, 26, 27) configured to move the retainer member (18) from said open to said closed position or vice versa.

12. A launching device according to claim 10 or 11, where the device is provided with second activator means (28, 29) configured to move said rotatable portion of the launching device over a given distance in the direction of the longitudinal axis (L) between a position, in which a target (1) can be pricked up by the launching device and another position along the longitudinal axis (L).

13. A launching device according to claim 10, 11 or 12, where the retainer member (18) is provided with two different sub-surfaces (22, 23) and where the first activator means is provided with a tubular member (24) configured to undergo longitudinal displacement on the outer circumferential surface of said body portion (13) of the rotatable portion of the launching device in contact with at least one of said sub-surfaces (22, 23), such that when the tubular member (24) is in contact with a first (22) of said sub-surfaces, the retainer member (18) is brought to its open position, and when the tubular member (24) is in contact with a second (23) of said sub-surfaces, the retainer member (18) is brought to its closed position.

14. A launching apparatus for launching sports shooting targets, where the apparatus (33) comprises at least one of the launching devices according to any of the preceding claims 9 to 13, where the launching apparatus (33) comprises holder legs (37) attached to a housing (34) of the apparatus (33) and configured such that said at least one launching device can be tilted an angle (α) relative to the apparatus (33), where the apparatus is provided with at least one supply container (38) for accommodating sports shooting targets according to any of the preceding claims 1 to 8, where the supply containers (38) are aligned with a corresponding launching device (35) such that this launching device (35) can pick up a target (1) from the supply container (38), and where the launching device can be tilted and angle (α) from a pickup position aligned with a corresponding supply container (38) to a launching position, where the picked up target is ready to be launched from the apparatus.

15. A method of launching a sports shooting target, the method comprising:

- providing a sports shooting target (1) according to any of the preceding claims 1 to 8;
- accelerating the sports shooting target (1) about its rotational axis until a predetermined terminal rotational speed of the target (1) about the rotational axis is reached;
- directing said rotational axis in a desired direction (E) relative to the surroundings; and
- releasing the target;

whereby the target will move along a trajectory in space, stabilized by gyro effect caused by rotation about the rotational axis of the target and propelled along said trajectory by the rotation about the rotational axis of the target.

16. The use of rotating a sports shooting target about a rotational axis of the target to provide a combined trajectory stabilizing effect and propulsion of the target along the trajectory.

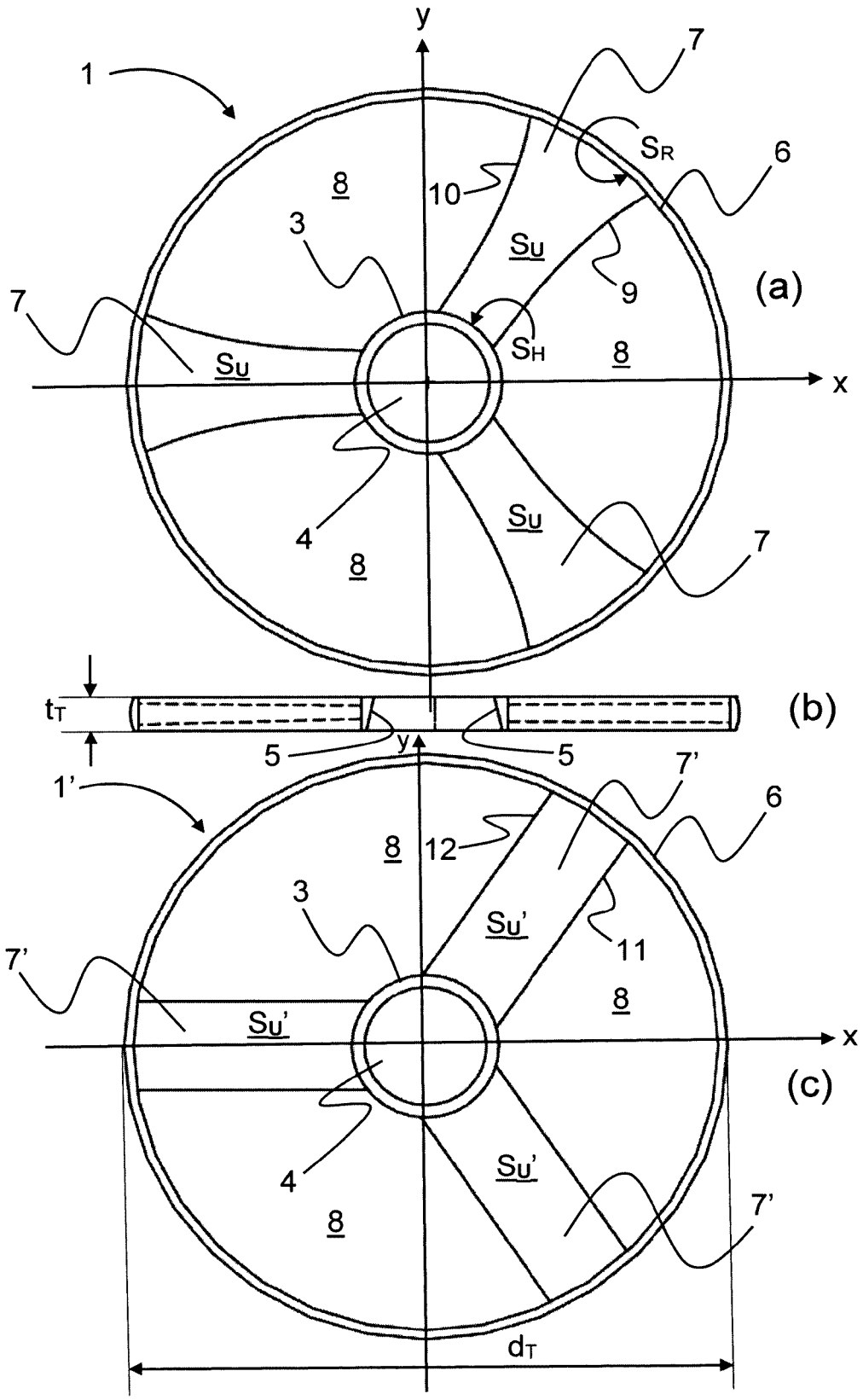
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Fig. 1

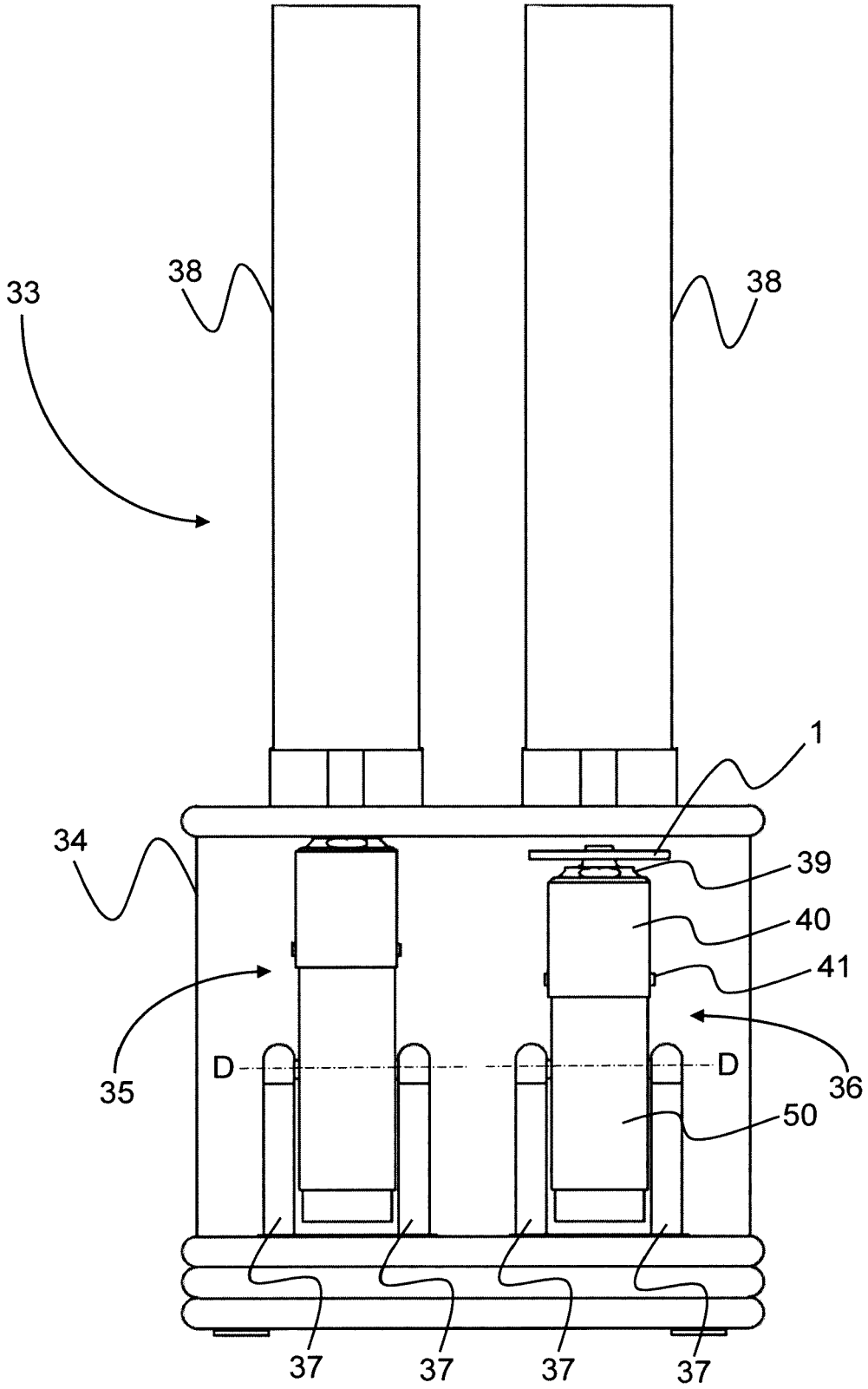

Fig. 5

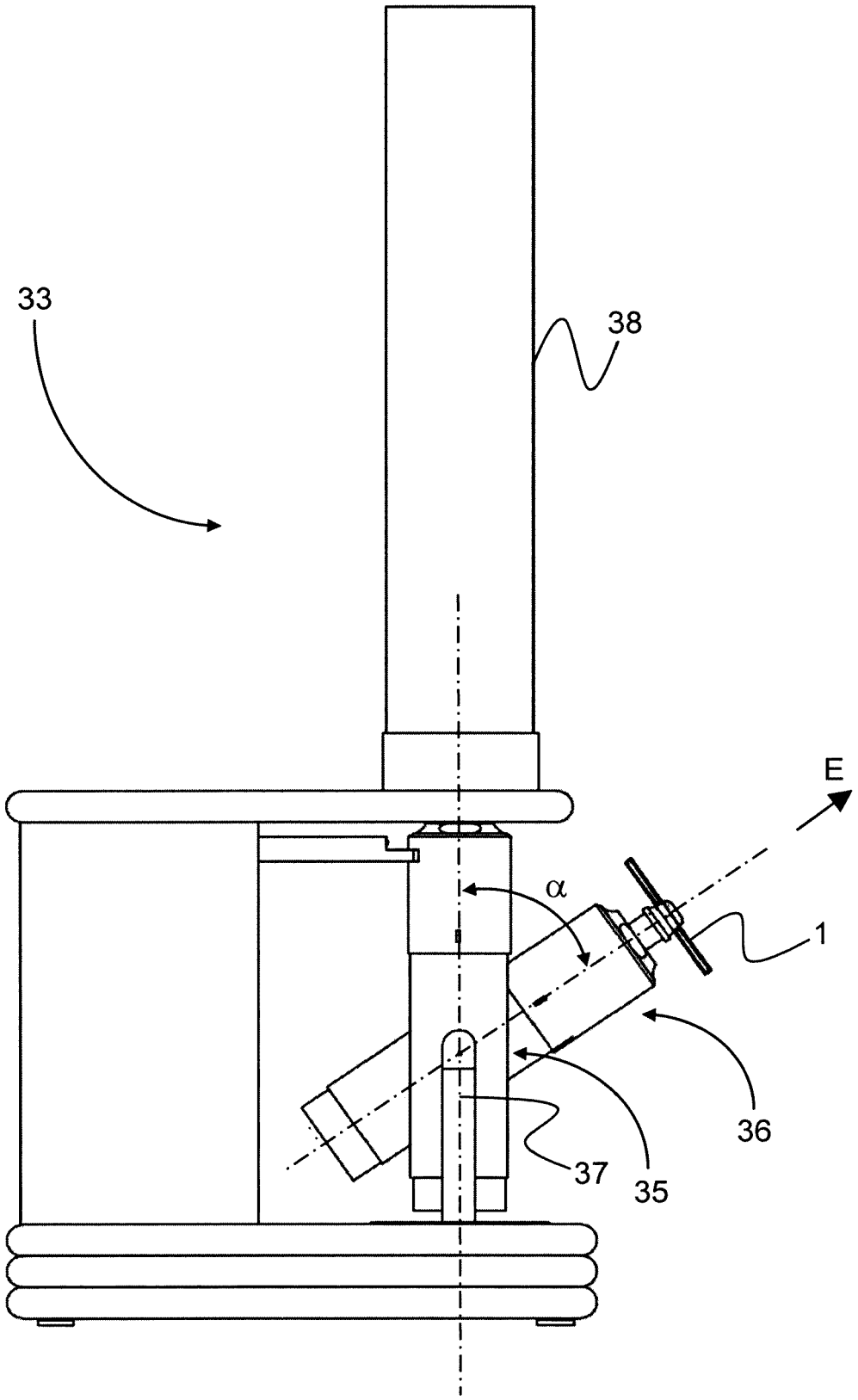

Fig. 6

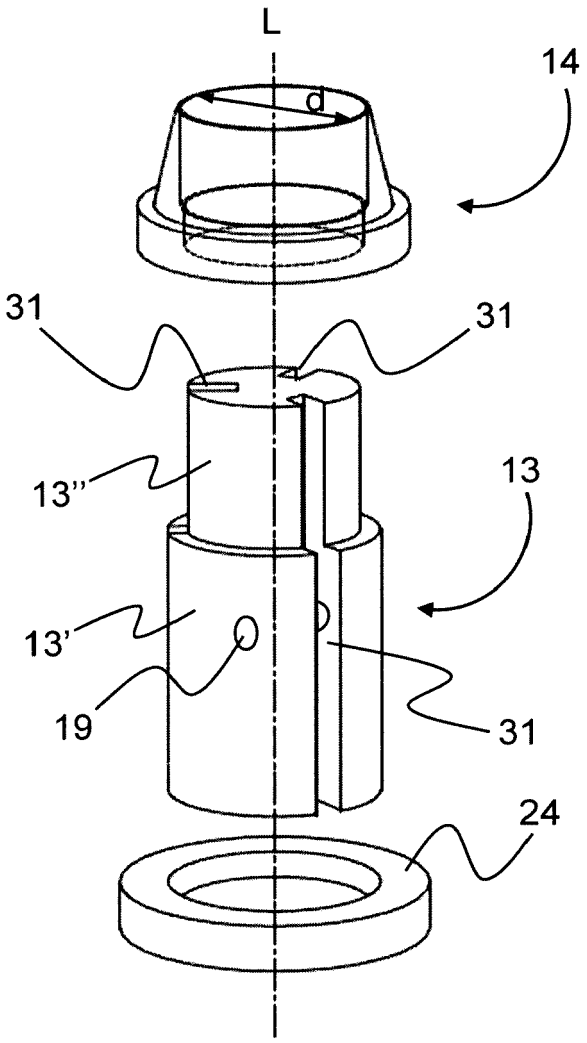

Fig. 3

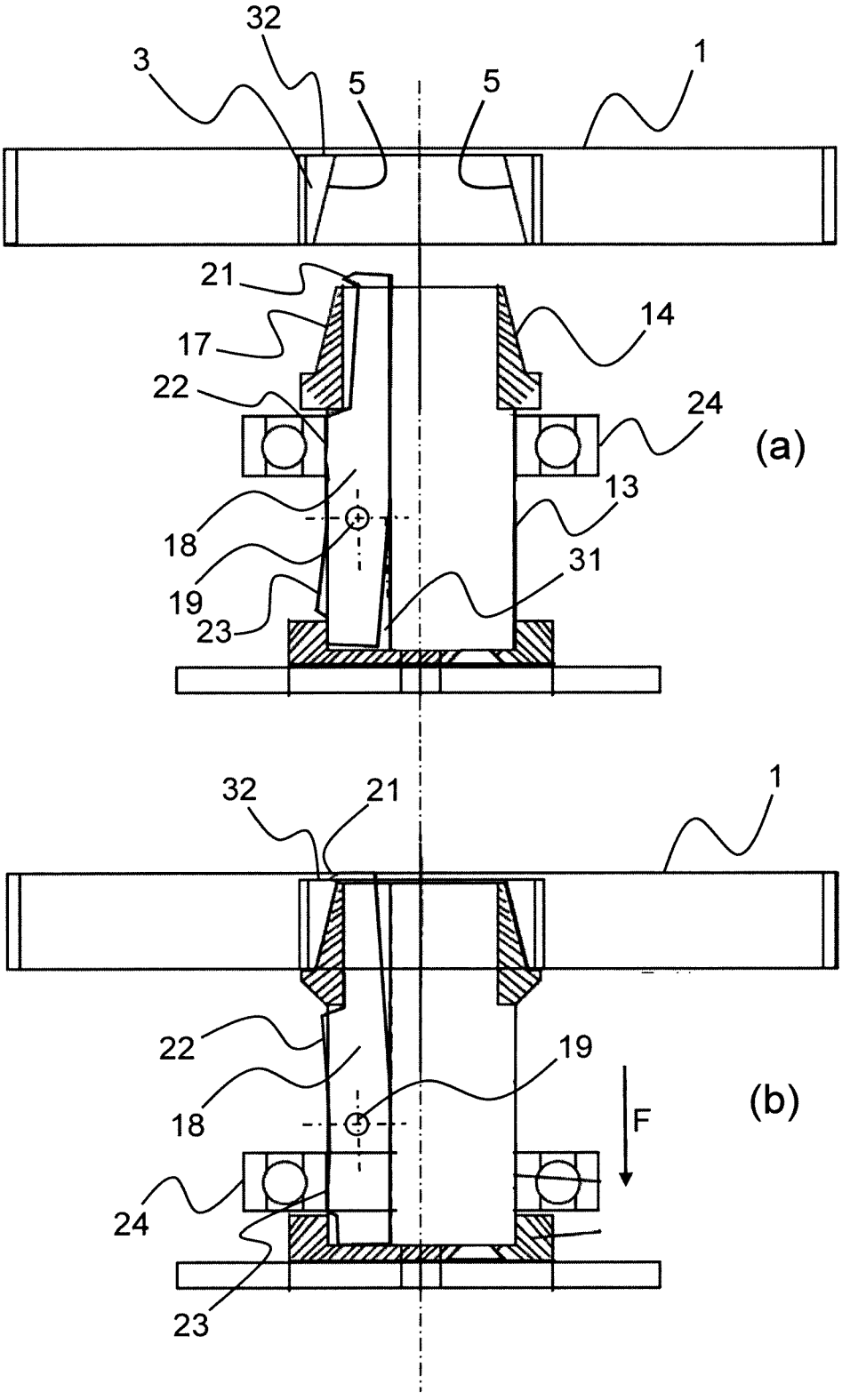

Fig. 4

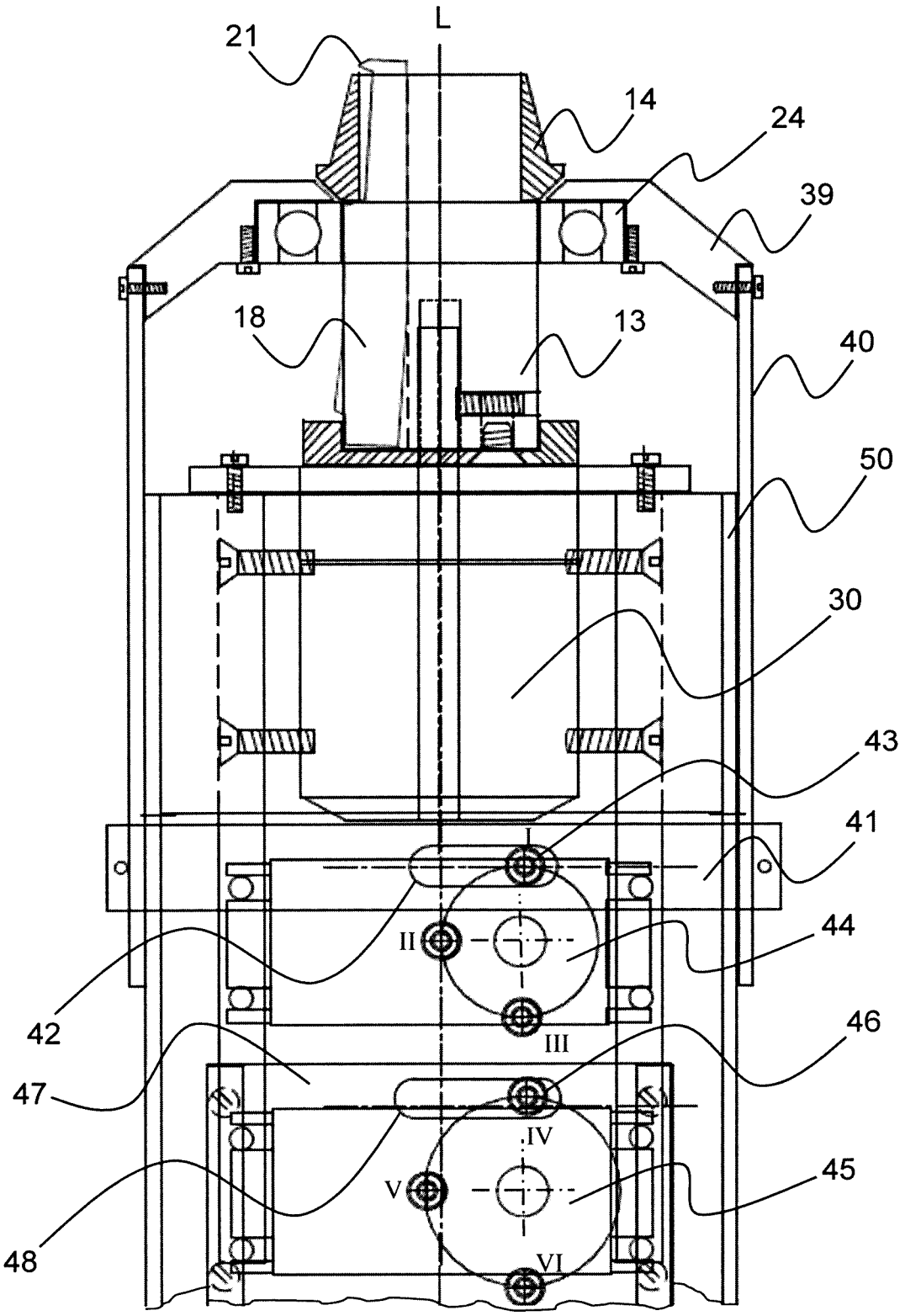

Fig. 7

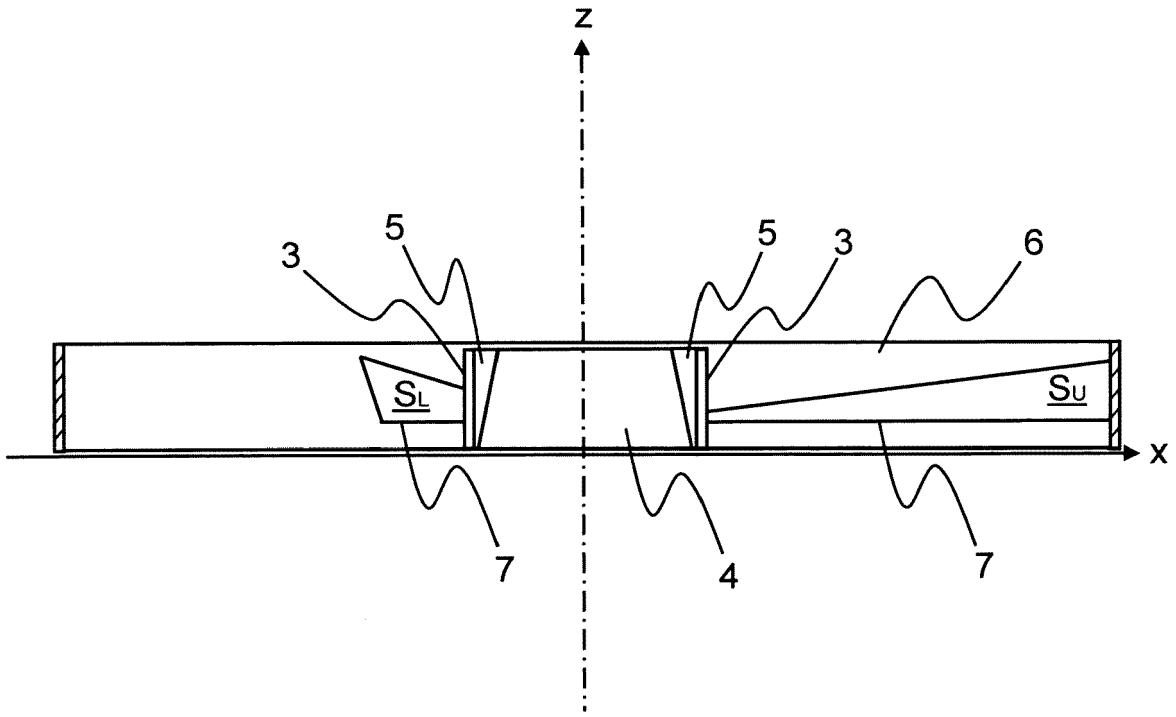

Fig. 1(d)

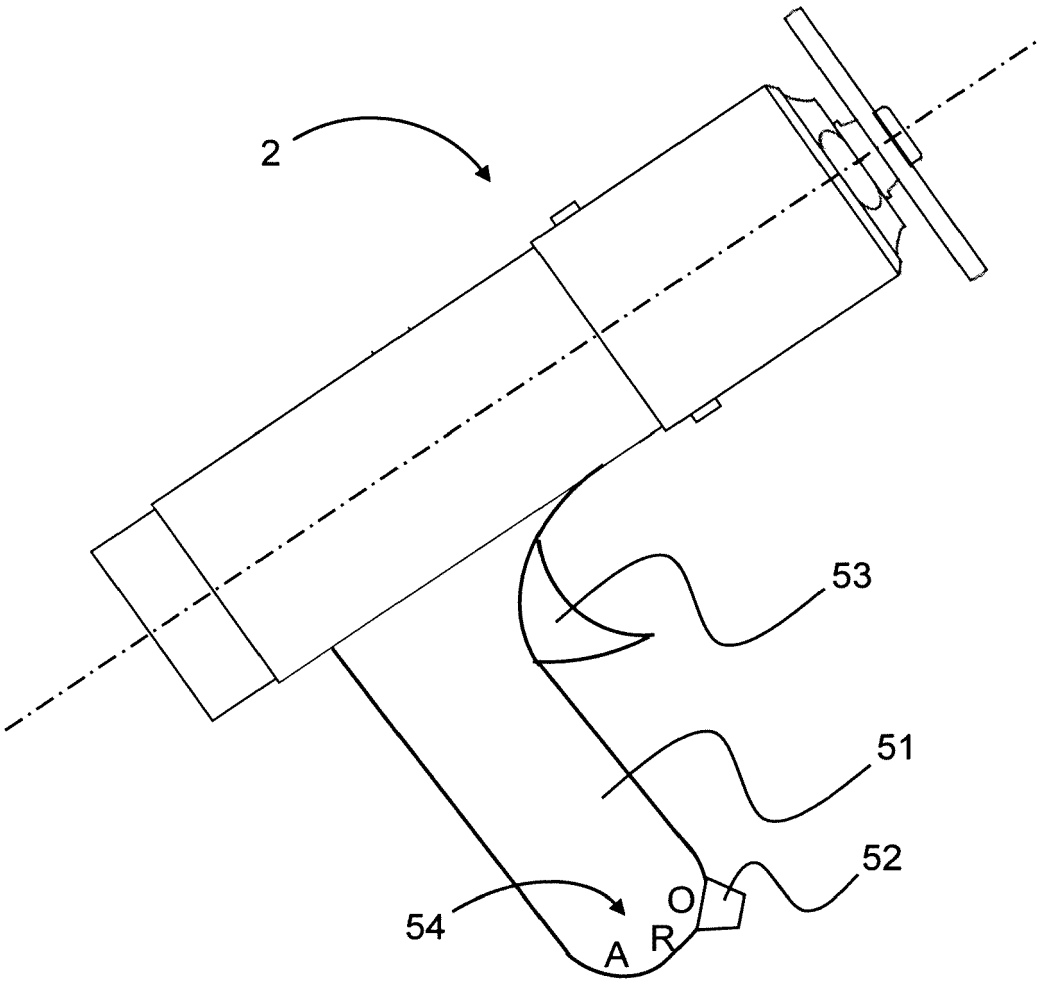

Fig. 8

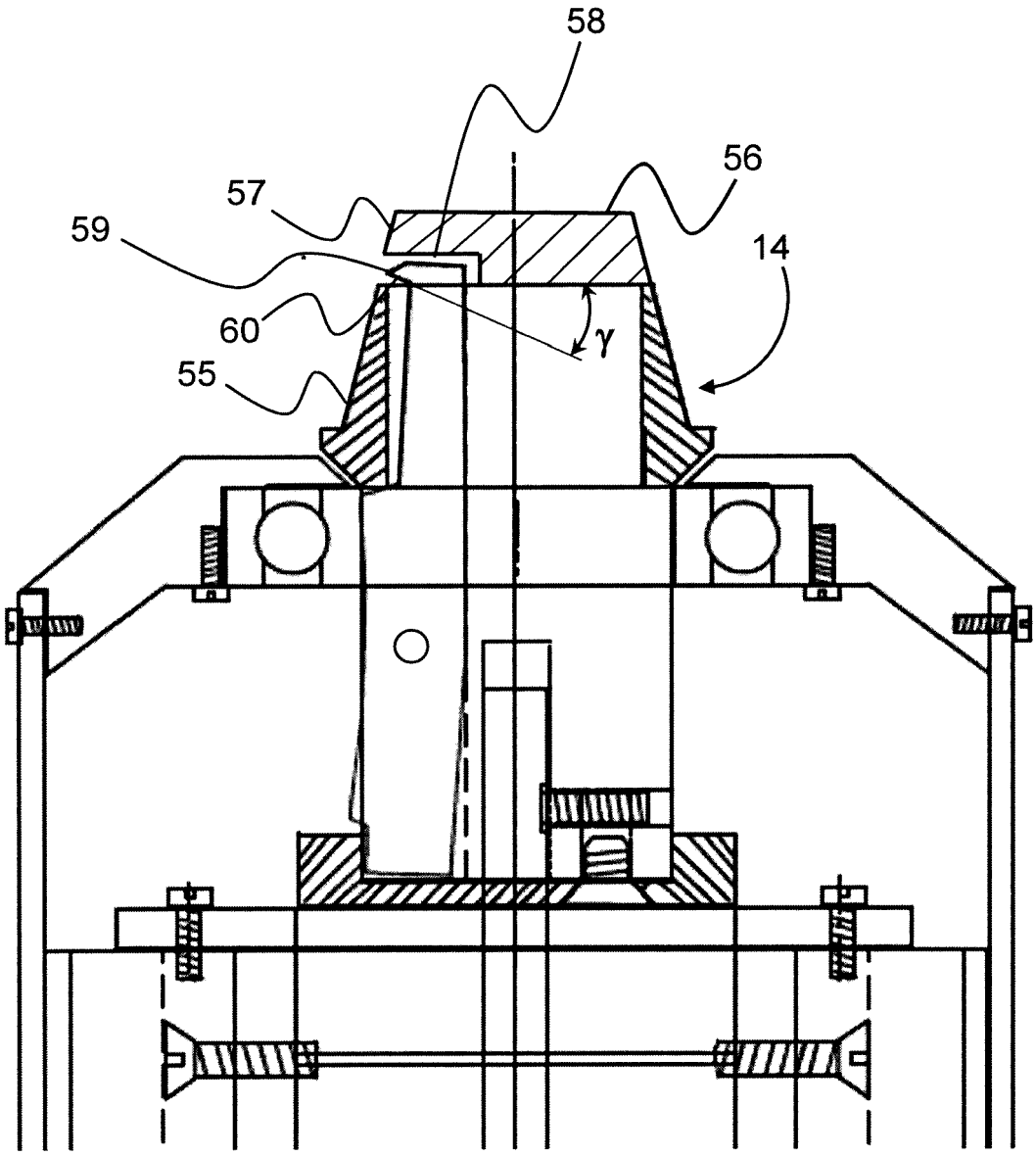

Fig. 9

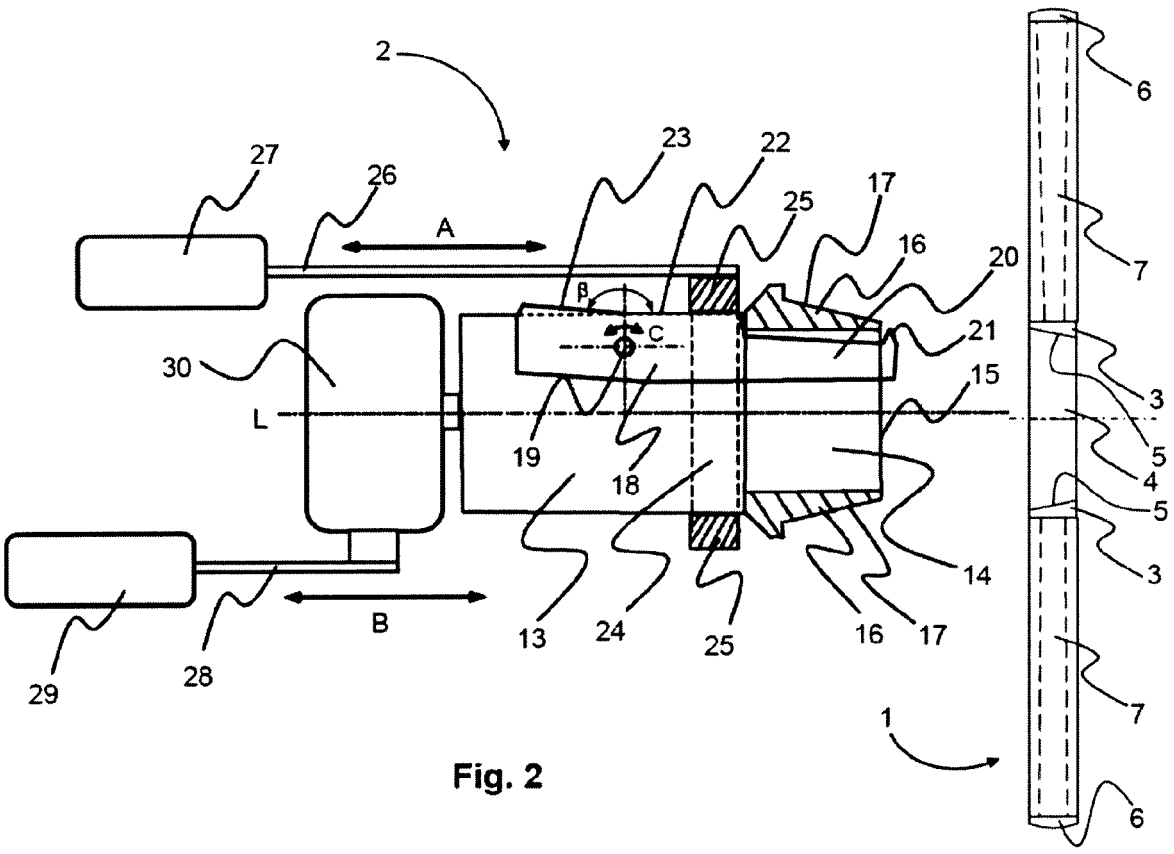
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Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 16 38 8004

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 5 316 313 A (MOORE PATRICK T [US]) 31 May 1994 (1994-05-31) * abstract * * column 2, line 46 - column 4, line 21 * * figures 1-4 *	1-3,5,6, 15,16 4,7,8,14	INV. F41J9/16 F41J9/18
X	US 2012/187630 A1 (BARZEE STEVE T [US]) 26 July 2012 (2012-07-26) * paragraphs [0015] - [0022] * * figures 1,2 *	1,3,15, 16	
X	US 5 575 479 A (AYRES JOHN A [US]) 19 November 1996 (1996-11-19) * abstract * * column 2, line 56 - column 4, line 26 * * figures 1-9 *	1-3,15, 16	
X A	WO 02/090868 A1 (RODENGHI F LLI S R L [IT]; RODENGHI GIOVANNI [IT]; RODENGHI GIUSEPPE []) 14 November 2002 (2002-11-14) * abstract * * page 2, last paragraph - page 3, paragraph one before last * * figures 1-4 *	9,15,16 10-14	TECHNICAL FIELDS SEARCHED (IPC) F41B F41J F41F
X	US 4 508 093 A (BERTINI MILLO [US]) 2 April 1985 (1985-04-02) * abstract * * column 4, line 37 - column 9, line 6 * * figures 1-6 *	9,15,16	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 November 2016	Menier, Renan

CATEGORY OF CITED DOCUMENTS

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01-11-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5316313 A	31-05-1994	NONE	
US 2012187630 A1	26-07-2012	NONE	
US 5575479 A	19-11-1996	NONE	
WO 02090868 A1	14-11-2002	EP 1386119 A1	04-02-2004
		IT MI20010927 A1	07-11-2002
		WO 02090868 A1	14-11-2002
US 4508093 A	02-04-1985	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82