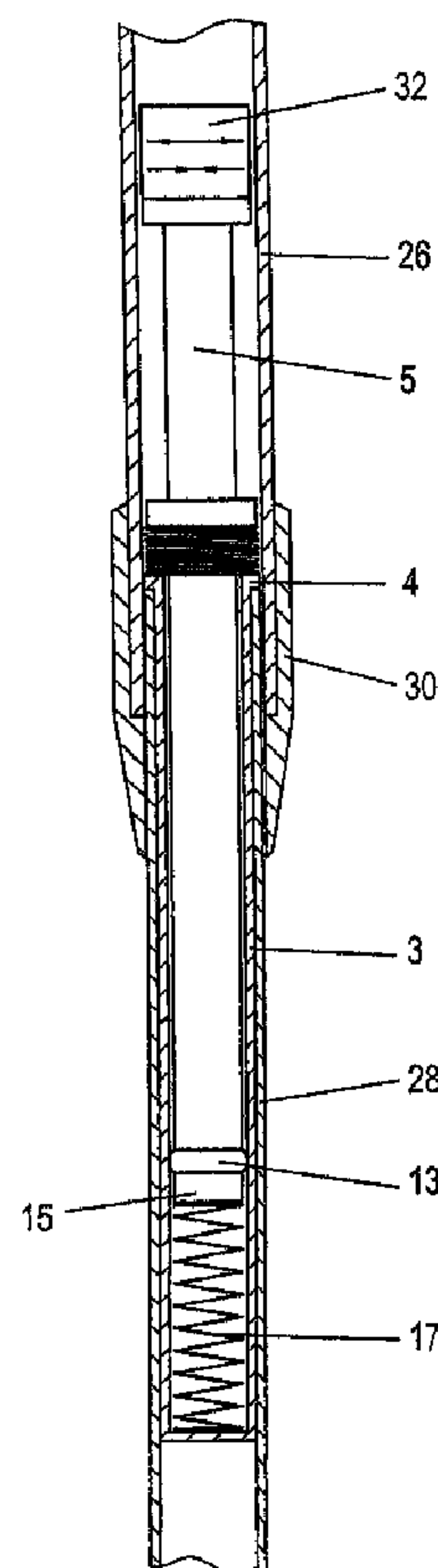




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(54) Title: DAMPING DEVICE



(57) Abrégé/Abstract:

A damping device located between the handle and the pole tube of an athletic pole such as a ski pole, combines the action of a helical compression spring (17) with that of a gas compression spring, in the tube (3) a rod-shaped body (5) being movable. On the



(57) **Abrégé(suite)/Abstract(continued):**

end of the rod-shaped body (5) there is an elastic insert (13) which is loaded by the helical compression spring (17). If the rod-shaped body (5) is pressed into the tube (3), for example when the pole is put down on the ground, the insert (13) deforms and seals from the inside against the tube (3), forming a gas compression spring. The damping action is increasingly intensified by the friction of the deformable insert (13) in the tube (3.)

Abstract:

A damping device located between the handle and the pole tube of an athletic pole such as a ski pole, combines the action of a helical compression spring (17) with that of a gas compression spring, in the tube (3) a rod-shaped body (5) being movable. On the end of the rod-shaped body (5) there is an elastic insert (13) which is loaded by the helical compression spring (17). If the rod-shaped body (5) is pressed into the tube (3), for example when the pole is put down on the ground, the insert (13) deforms and seals from the inside against the tube (3), forming a gas compression spring. The damping action is increasingly intensified by the friction of the deformable insert (13) in the tube (3.)

Damping device

The invention relates to a device for damping the relative motion between two bodies which can move relative to one another, especially between two parts of a pole, preferably between the handle and the rod of the pole, with the features of the introductory part of claim 1.

These damping devices are used especially for poles with a handle, in which the handle can move relative to the pole in the axial direction against the force of a spring, in order to absorb the impact energy when the pole is put down, especially on hard ground, with low vibrations.

Known devices of this type between the pole and the handle have a steel helical compression spring which is guided on a steel rod and which extends in the lengthwise direction of the pole.

Other proposals use the combination of a steel helical compression spring with elastomer bodies located on both sides of the spring, by which improved damping action is to be achieved.

A device of the initially named type is known in FR-A-2 387 064.

The object of the invention is to present a device of the initially mentioned type with improved damping action.

This object is achieved as claimed in the invention with a device which is characterized

by the features of the independent claim.

Preferred and advantageous embodiments of the damping device as claimed in the invention are the subject matter of the invention.

In the damping device as claimed in the invention, advantageously the action of a (metal) helical compression spring is combined with the action of a gas compression spring. This yields a damping action which is initially small and grows as the damping device is increasingly compressed, until finally the end of the stroke of the damping device is reached.

In the invention it is provided that a rod-shaped body

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In the damping device as claimed in the invention, advantageously the action of a (metal) helical compression spring is combined with the action of a gas compression spring. This yields a damping action which is initially small and grows as the damping device is increasingly compressed, until finally the end of the stroke of the damping device is reached.

In one embodiment it is provided that a rod-shaped body is held with its lower end in a tube closed on one side, and that on its end in which the tube is held there is a seal between the rod-shaped body and tube, which seal is activated by pressure on the rod-shaped body in the direction of displacement into the tube. In this embodiment it is advantageous that the piston of the gas compression spring is equipped with an automatically activating ring seal which also acts as a valve such that the valve formed by the ring seal closes when the gas compression spring is compressed (when the stick is put down), and is open when the gas compression spring moves apart.

In one embodiment it is provided that on the open end of the tube there is an end stop damper. Here it is preferable that when the rod-shaped body has been pushed into the tube the ring-shaped end stop adjoins the end stop damper and clamps it between the open end of the tube and the end stop. This has the advantage that the damping device is caught and stopped gently at the end of its stroke, not suddenly.

Other details and features of the invention will become apparent from the following description of one preferred exemplary embodiment using the drawings.

Figures 1 to 5 show different positions of the damping device as claimed in the

invention, Figure 6 shows a ski pole and Figure 7 an example of installation of a damping device in the ski pole and corresponding to a cross-section through Detail 1 of Figure 6.

The damping device as claimed in the invention consists of a rod-shaped body 5 which is held in the tube 3 and which on its top end bears a ring flange 7. At a distance from the top end of the rod-shaped body 5 there is a ring-shaped stop 9 for limiting the stroke of the rod-shaped body 5 relative to the tube 3.

The rod-shaped body 5 with its area which is located underneath the end stop damper 11 in the form of a rubber spring is held in the tube 3 of a pole, for example a ski pole or walking stick (compare Figure 6).

On its end held in the tube 3 the rod-shaped body 5 bears an elastically deformable seal 13 in the form of a disk which is covered on the free end of the rod-shaped body 5 by an intermediate disk 15 which can move axially relative to the rod 5. Underneath the intermediate disk 15 is a helical compression spring 17 which adjoins the intermediate disk 15 and which with its other end is supported on the closed end 19 of the tube 3 in which the rod 5 is held.

If at this point in the direction of the arrow 21 shown in Figure 1 pressure is applied to the rod-shaped body 5, it moves into the tube 3, the elastic insert 13 being deformed by the pressure applied by the spring 17 to the intermediate disk 15 such that its side surface which is first of all essentially in the shape of a cylindrical jacket arches to the outside in a bead shape and is placed against the inner surface of the tube 3 (ring seal). In this way gas (air) is enclosed in the tube 3 in the area of the helical spring 17 and acts as a gas compression spring which supports the spring force of the helical spring 17 (Figure 2). As the movement of the rod-shaped

body 5 down continues (Figure 3) the pressure of the spring 17 on the intermediate disk 15 becomes greater and the elastic insert 13 is pressed with its peripheral surface more and more strongly against the inside surface of the tube 3 so that the friction between the outside of the insert 13 and the inner surface of the tube 3 is continuously increased and thus the damping action is increasingly intensified by increasing friction.

At the end of the motion of the rod-shaped body 5 down, its stop 9 rests on the end stop damper 11 which is for example an elastically deformable body which can be made in the manner of bellows.

When the pressure in the direction of the arrow 21 shown in Figure 1 stops, the elastically deformable insert 13 again assumes its cylindrical shape and the helical compression spring 17 pushes the rod-shaped body 5 up out of the tube 3 and the damping device moves back into its initial position as shown in Figure 5.

When the rod-shaped body 5 moves down, damping of the motion of the rod-shaped body 5 relative to the tube 3 is achieved by the described design of the damping device as claimed in the invention by:

a) Action of the gas compression spring (compression of the gas cushion in the lower part of the tube 3),

b) Compression of the helical compression spring 17 between the rod-shaped body 5 and the bottom 19 of the tube 3 and

c) Friction between the inner surface of the tube 3 and the periphery of the outside surface of the insert 13 of elastic material, which surface is deformed into the shape of a bead.

Figure 6 shows a ski pole 20. Figure 7 shows in an axial section how the damping device described using Figures 1 to 5 with respect to its structure and function can be installed in the pole 20 with the handle 24 according to the exemplary embodiment of the invention.

Figure 6 schematically shows a ski pole 20 with a pole tube 22 which in the part connected to the handle 24 consists of two parts which can move relative to one another, specifically a telescoping upper part 26 and a telescoping middle part 28.

Figure 7 shows one particular of the ski pole 20 from Figure 6 partially in section, which particular is shown in Figure 6 with detail 1.

Figure 7 shows that the telescoping upper part 26 of the pole tube 22 is placed over the telescoping middle part 28 of the pole tube 22, the lower end of the telescoping upper part 26 being lined with a sleeve 30.

The telescoping upper part 26 of the ski tube 22 is coupled to the rod-shaped body 5 of the damping device as shown in Figures 1 to 5, so that for example when the pole 20 is put down on the ground, pressure applied via the handle 24 to the telescoping upper part 26 causes the rod-shaped body 5 to be pushed down, as shown in Figures 1 to 3..

The coupling 32 between the telescoping upper part 26 and the rod-shaped body 5 of the damping device can be made in the manner of a radially expandable clamp part as is known for athletic poles of variable length and which can be actuated by relative turning of the telescoping parts 26 and 28.

In the top end of the telescoping middle part 28 of the pole tube 22 the damping device as claimed in the invention is held with its tube 3, the tube 3 resting with the upper end flange 4

on the free end of the telescoping middle part 28.

In summary, one exemplary embodiment of the invention can be explained as follows;

A damping device located between the handle 24 and the pole tube 22 of an athletic pole 20, such as a ski pole, combines the action of a helical compression spring 17 with that of a gas compression spring, in the tube 3 a rod-shaped body 5 being movable. On the end of the rod-shaped body 5 there is an elastic insert 13 which is loaded by the helical compression spring 17. If the rod-shaped body 5 is pressed into the tube 3, for example when the pole 20 is put down on the ground, the insert 13 deforms and seals from the inside against the tube 3, forming a gas compression spring. The damping action is increasingly intensified by the friction of the deformable insert 13 in the tube 3.

CLAIMS:

1. A device for damping relative motion between a handle and a rod of a pole, the device comprising:
 - a tube with a closed lower end, the lower end fixed within the rod;
 - a rod-shaped body with a free lower end held in the tube;
 - an elastically deformable seal on the free lower end of the rod-shaped body, for deforming under pressure to bear against an inner surface of the tube;
 - a helical compression spring clamped between i) the closed lower end of the tube and ii) the free lower end of the rod-shaped body; and
 - the helical compression spring creating pressure on the seal for deforming the seal to bear against the inner surface of the tube upon displacement of the rod-shaped body into the tube to form a gas compression spring including a gas-filled space located within the tube between the closed lower end of the tube and the seal bearing against the inner surface of the tube.
2. The device as defined in claim 1, further comprising an intermediate disk located at the free lower end of the tube and supporting the helical compression spring.
3. The device as defined in claim 1, further comprising a ring-shaped end stop located at a stroke position on the rod-shaped body for limiting a stroke of the rod-shaped body relative to the tube.
4. The device as defined in claim 3, further comprising an end stop damper mounted on an open end of the tube.
5. The device as defined in claim 4, wherein pushing the rod-shaped body into the tube moves the ring-shaped end stop against the end stop damper and clamps the end stop damper between the open end of the tube and the end stop.

6. The device as defined in claim 1, wherein the tube is part of the pole.
7. The device as defined in claim 1, wherein the tube is located within a pole tube of an athletic pole.
8. The device as defined in claim 7, wherein
the tube comprises an upper end flange resting on a top surface of a telescoping part,
and
the rod-shaped body is coupled to a handle side part at a top end of the rod-shaped body via a coupling.
9. The device as defined in claim 8, wherein the coupling between the rod-shaped body and the handle side part of the pole tube is a releasable coupling.
10. The device as defined in claim 8, wherein the handle is located on the handle side part of the pole, the handle side part and the telescoping part telescoping one into the other.
11. The device as defined in claim 1, wherein the seal is in the shape of a disk.
12. The device as defined in claim 1, wherein the seal functions as a valve of the gas compression spring, which valve is closed when the gas compression spring is compressed under the displacement of the rod-shaped body into the tube, the helical compression spring creating the pressure on the seal that deforms the seal to bear against the inner surface of the tube, and the valve is open when the gas compression spring is decompressed.
13. A damping device for damping shock received in a pole, the device comprising:
a pole including a handle, a handle side part and a telescoping part;
a tube with a closed lower end and an upper end flange resting on a top surface of the

telescoping part;

an end stop damper mounted on a top surface of the tube;

a rod-shaped body coupled to the handle side part via a coupling, and having a lower free end slidably held within the tube, and the rod-shaped body having a ring-shaped stop located at a stroke position limiting a stroke of the rod-shaped body in the tube;

an elastically deformable seal mounted on the free end of the rod-shaped body, the seal being in the shape of a disk; and

a helical compression spring located between the seal and the closed lower end of the tube, the helical compression spring, upon a downward stroke of the body, creating a pressure for deforming the seal to bear against an inner surface of the tube, the seal acting as a valve to close the tube and to seal and compress a gas enclosed within the tube between the deformed seal and the closed lower end of the tube.

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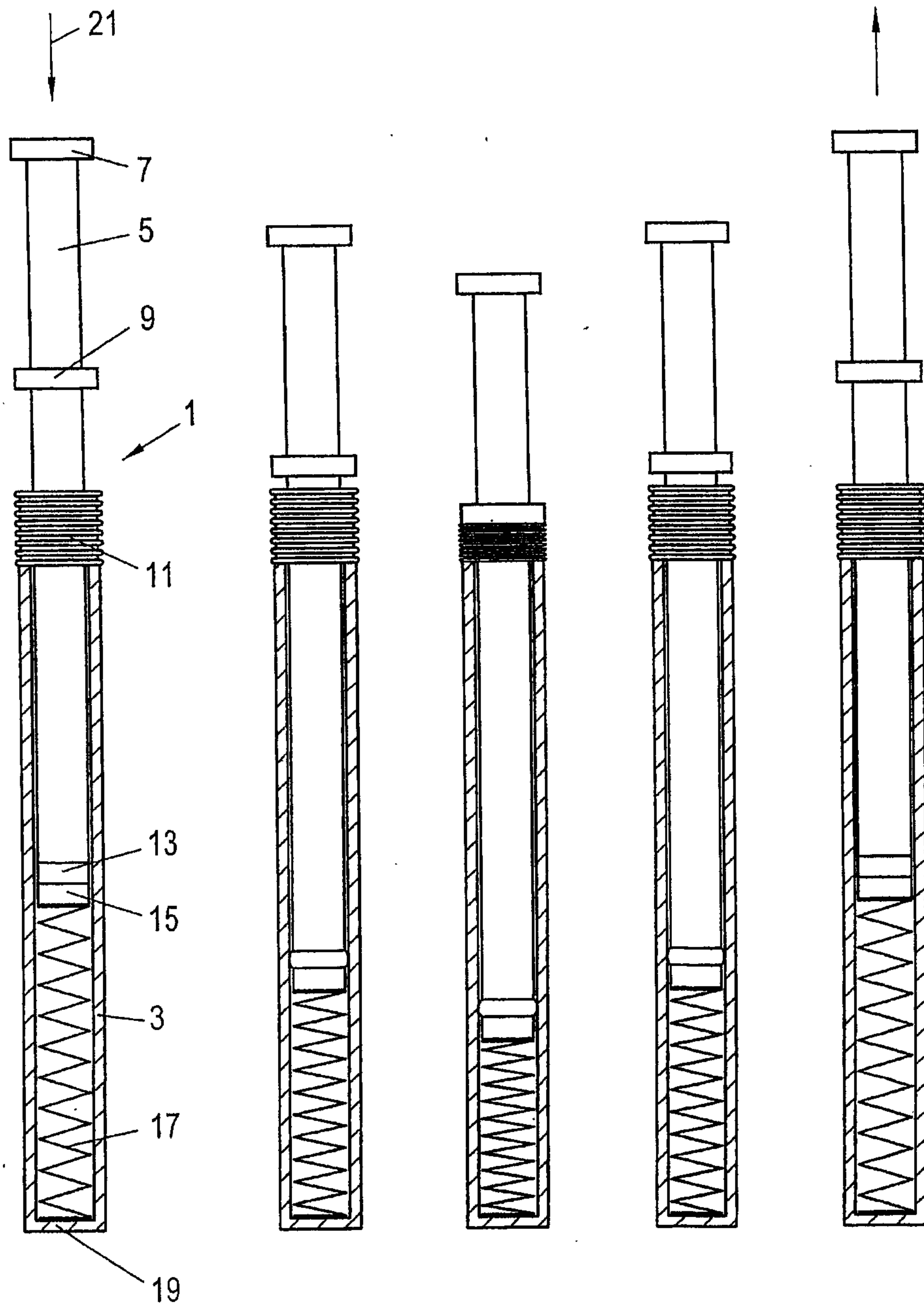


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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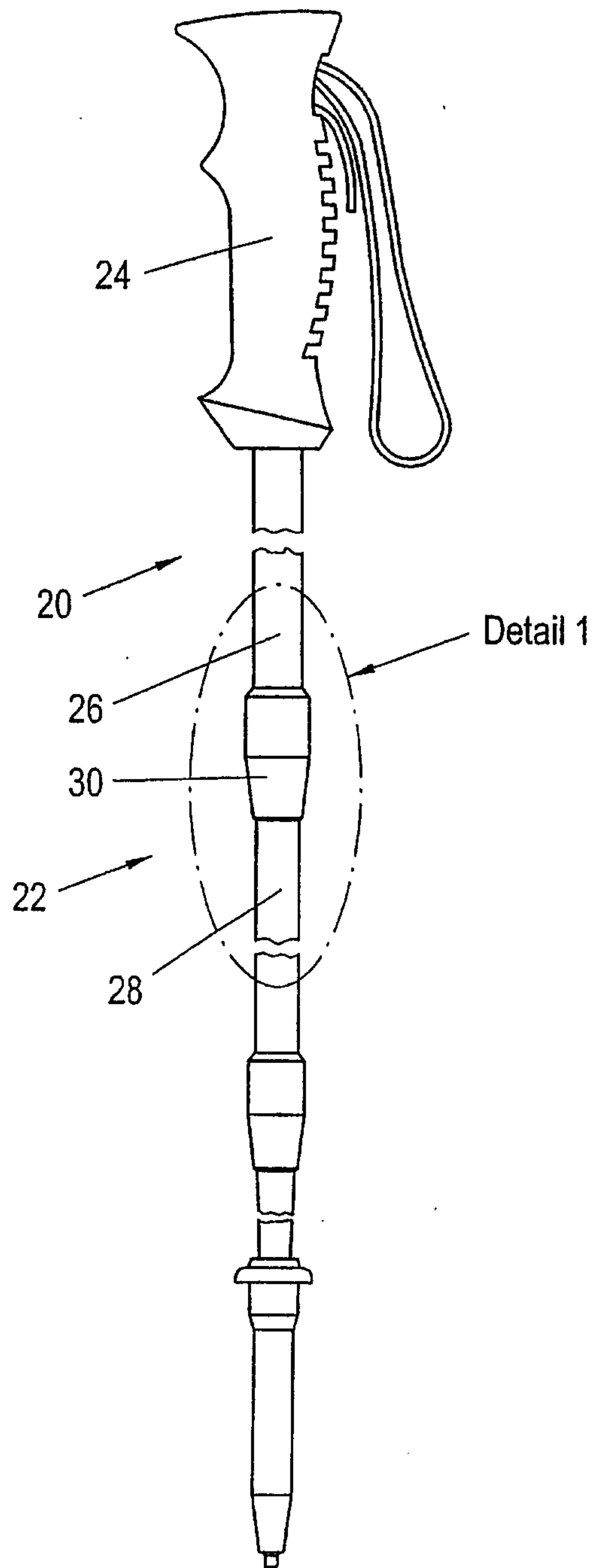


FIG. 6

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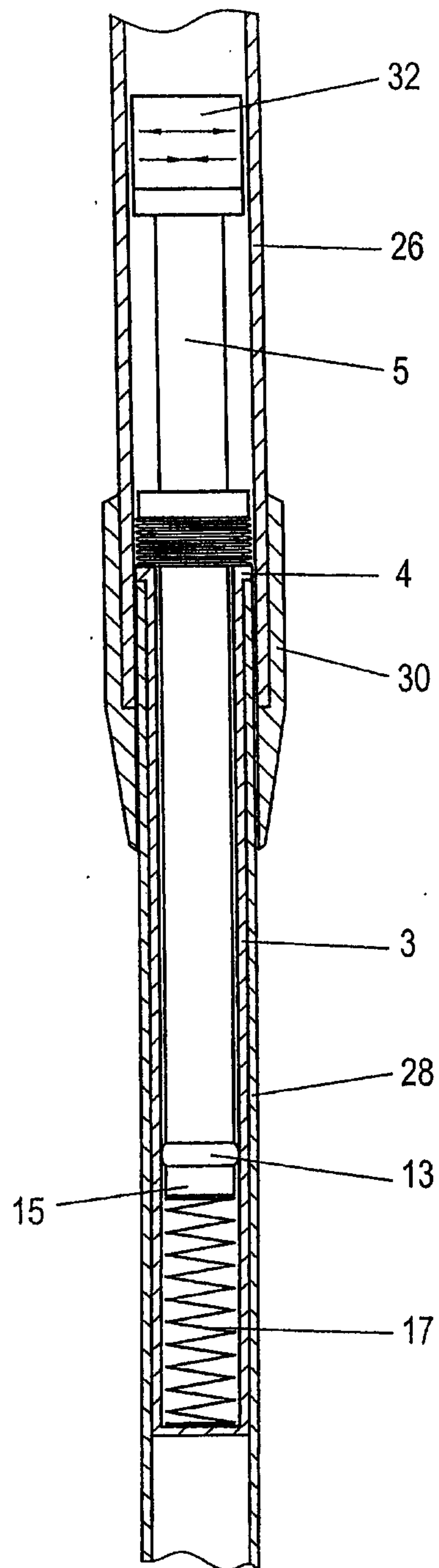


FIG. 7

