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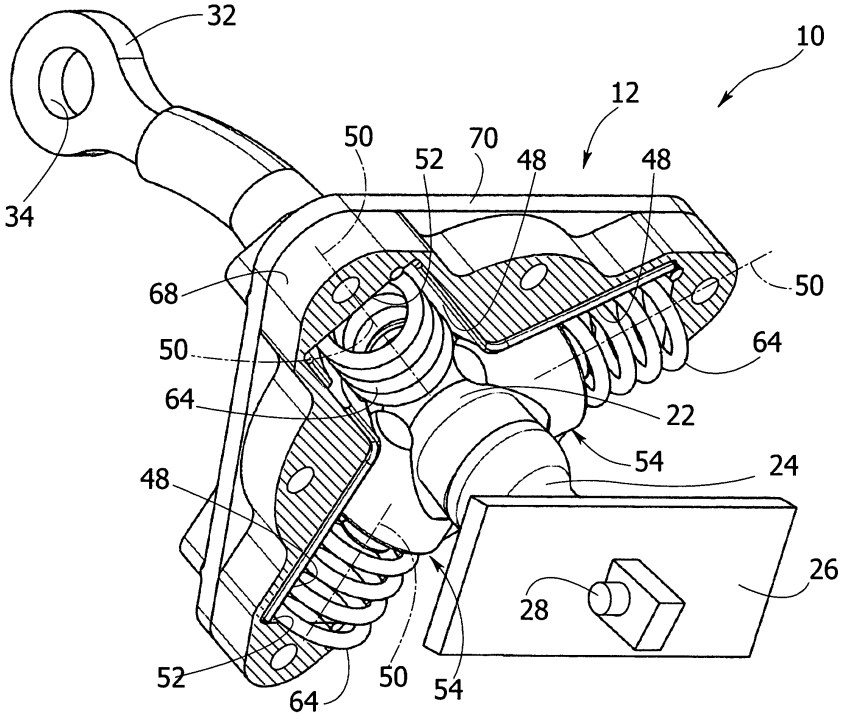
(54) Door check device for vehicles

(57) A door-stop device for vehicles, comprising:
- a tie-rod (14) having an external surface with circular cross section, provided with at least one retention seat (20, 22, 24);
- a support (12) having a passage (44, 46), through which the tie-rod (14) extends;
- three retention bodies (54), carried by the support (12) and co-operating with said retention seat (20, 22, 24) for defining at least one position of stable retention of the tie-rod (14) with respect to the support (12); and
- elastic means (64) acting between said retention bodies (54) and said support (12) for pushing said retention bodies (54) against the tie-rod (14) in radial directions (50) with respect to the tie-rod (14).

The support (12) comprises three rectilinear guides (48) with respective axes (50) arranged radially with respect to the tie-rod (14) and set at an angular distance apart from one another, each of said retention bodies (54) being guided slidably within a respective guide (48).

FIG. 2



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Description

[0001] The present invention relates to a door-stop device for vehicles, of the type comprising: a longitudinal tie-rod, a support having a passage through which the tie-rod extends, a plurality of retention bodies co-operating with at least one retention seat of the tie-rod for defining at least one position of stable retention of the tie-rod with respect to the support, and elastic means acting between said retention bodies and said support for pushing the retention bodies against the tie-rod.

[0002] More precisely, the invention relates to a door-stop device in which the longitudinal tie-rod has a circular cross section and in which three retention bodies are provided, set at an angular distance apart from one another and pushed against the tie-rod in radial directions with respect to the axis of the tie-rod. A tie-rod of this type is known from EP-A-1146187, in the name of the present applicant, on which the preamble of Claim 1 is based.

[0003] The door-stop device known from EP-A-1146187 enables compensation of errors of planarity between the door and the upright thanks to the fact that the tie-rod has a circular cross section. The retention bodies enable the tie-rod to assume a position inclined in any plane with respect to a theoretical axis corresponding to the ideal position of the tie-rod in the absence of errors or of tolerances of assembly between the door and the upright of the vehicle.

[0004] The object of the present invention is to provide an improved door-stop device that will enable improvement of the distribution of the force applied by the retention bodies on the tie-rod and that will enable a more regular operation to be obtained without any noise also in the presence of considerable errors of planarity.

[0005] According to the present invention, said object is achieved by a door-stop device having the characteristics forming the subject of Claim 1.

[0006] The characteristics and advantages of the present invention will emerge clearly in the course of the ensuing detailed description, which is provided purely by way of non-limiting example and in which:

- Figure 1 is a perspective view of a door-stop device according to the present invention;
- Figure 2 is a partially sectioned perspective view of the door-stop device of Figure 1;
- Figure 3 is a side elevation of the device of Figure 1;
- Figure 4 is a cross section according to the line IV-IV of Figure 3;
- Figure 5 is a partial cross section according to the line V-V of Figure 4;
- Figure 6 is a cross section according to the line VI-VI of Figure 4;
- Figure 7 is an exploded perspective view of the device of Figure 1; and
- Figure 8 is an exploded perspective view illustrating a variant of the device according to the invention.

[0007] With reference to the figures, the number 10 designates a door-stop device according to the present invention. The door-stop device 10 comprises a support 12 and a tie-rod 14 that is mobile through the support 12. The tie-rod 14 is preferably formed by a metal core 16, on which a co-moulded plastic coating 18 is applied. In cross section, the tie-rod 14 has an external surface of circular shape. The cross-sectional diameter of the tie-rod 14 is variable along the longitudinal axis of the tie-rod, so as to form at least one retention seat on the external surface of the tie-rod 14. In the example illustrated in the figures (see in particular Figure 6), the tie-rod 14 is provided with three retention seats, designated by 20, 22 and 24, respectively. The retention seats 20, 22, 24 are constituted by portions with smaller cross-sectional diameter. Preferably, as is illustrated in Figures 4 and 6, the core 16 has a cross section of rectangular shape, with constant or substantially constant area, whilst the thickness of the co-moulded coating 18 varies along the axis of the tie-rod 14 for forming the retention seats 20, 22 and 24.

[0008] The tie-rod 14 is provided at a first end with an arrest plate 26, fixed between a front end of the co-moulded coating 18 and a pin 28 that engages a transverse hole of the metal core 16. At the opposite end, the tie-rod 14 is articulated to a bracket 30 about an axis orthogonal to the longitudinal axis of the tie-rod 14. The bracket 30 is designed to be fixed to the upright of a vehicle (not illustrated). One end of the metal core 16 is provided with a widened head 32 and a cylindrical hole 34 for articulation by means of a pin 36 to the bracket 30.

[0009] The support 12 has substantially the shape of a box with a three-lobed outer perimeter with two opposite front walls 40, 42, through which there are formed respective through openings 44, 46, through which in turn the tie-rod 14 extends. Formed within the support 12 are three rectilinear guides 48 with respective longitudinal axes 50 arranged radially with respect to the longitudinal axis of the tie-rod 14. The longitudinal axes 50 of the guides 48 are set at an angular distance apart from one another by 120°. Each guide 48 has a cylindrical lateral surface that terminates with a plane front surface 52, located at the radially external end of the respective guide 48. At their radially internal ends, the guides 48 are open and converge in an open space communicating with the openings 44, 46 through which the tie-rod extends 14.

[0010] The support 12 comprises three retention bodies 54, each of which slidably engages a respective guide 48 and is mobile in a guided way in the direction of a respective axis 50, orthogonal to the longitudinal axis of the tie-rod 14. Each retention body 54 has a cylindrical wall 56 that slidably engages the internal cylindrical wall of the respective guide 48. The cylindrical wall of each retention body 54 terminates with a substantially saddle-shaped engagement portion 58, having two curvatures (one concave and one convex) in two mutually orthogonal planes. The retention bodies 54 can be made of full plastic material, possibly reinforced with fibre, or else of

sintered metal material. Preferably, each retention body 54 is provided with a cylindrical pin 60 projecting from a plane resting surface 62 opposite to the engagement portion 58.

[0011] Also housed within each guide 48 is an elastic element 64 that pushes the respective retention body 54 towards the tie-rod 14. Each elastic element 64 has a radially external end that rests against the terminal surface 52 of the respective guide 48 and a radially internal end that rests against the surface 62 of the respective retention body 54. In the example illustrated in Figures 2 to 7, the elastic elements 64 consist of helical compression springs. The projecting pin 60 of each retention body 54 is inserted within the respective spring and performs a function of internal guide of the system. The pin 60 can also provide a contrast element of controlled arrest in order to prevent excessive compression of the respective elastic element 64, in this way preventing the elastic element from losing its functionality. Said pin can be located either on the slider 54 or at the closed end 52 of the retention chamber, or on both.

[0012] In the variant illustrated in Figure 8, the elastic elements 64 consist of bodies made of elastomeric material provided with front surfaces set in contact with the surfaces 52 of the guides 48 and, respectively, with the surfaces 62 of the retention bodies 54. Each body made of elastomeric material can be provided with a hole, within which the projecting pin of the respective retention body 54 is inserted. The bodies made of elastomeric material can also be provided with transverse holes 66 for increasing flexibility thereof.

[0013] The support 12 is preferably formed by a base body 68 and by a covering element 70, fixed to one another. The base body 68 comprises the front wall 40, formed in which is the through hole 44, and the covering element 70 comprises the front wall 42, formed in which is the through hole 46, the through holes 44, 46 being aligned to one another and serving, as already indicated previously, for the passage of the tie-rod 14. As may be seen in particular in Figures 5 and 6, the base body 68 is provided with semicircular seats 72 having radial axes that form a part of the guides 48. The covering element 70 is provided with semicircular seats 74 complementary to the semicircular seats 72. In the mutually coupled condition of the base body 68 and of the covering element 70, the seats 72, 74 form the cylindrical guides 48 with circular cross section. The base body 68 and the covering element 70 are preferably made of injection-moulded plastic material and are fixed to one another, for example, by means of riveted pins, which engage holes 76 parallel to the longitudinal axis of the tie-rod 14. Alternatively, fixing between the base body 68 and the covering element 70 could be obtained by means of ultrasonic welding or else by means of mutually co-operating snap-action engagement members, made of a single piece with the two elements.

[0014] The retention bodies 54 and the elastic elements 64 are inserted at the front in the respective semicircular seats 72 of the base body 68. The covering element 70 is fixed at the front to the base body 68 after positioning of the retention bodies 54 and of the elastic elements 64 in the seats 72 of the base body 68.

Claims

1. A door-stop device for vehicles, comprising:

- a tie-rod (14) having an external surface with circular cross section provided with at least one retention seat (20, 22, 24);
- a support (12) having a passage (44, 46) through which the tie-rod (14) extends;
- three retention bodies (54), carried by the support (12) and co-operating with said retention seat (20, 22, 24) for defining at least one position of stable retention of the tie-rod (14) with respect to the support (12); and
- elastic means (64) acting between said retention bodies (54) and said support (12) for pushing said retention bodies (54) against the tie-rod (14) in radial directions (50) with respect to the tie-rod (14),

said door-stop device being **characterized in that** said support (12) comprises three rectilinear guides (48) with respective axes (50) arranged radially with respect to the tie-rod (14) and set at an angular distance apart from one another, each of said retention bodies (54) being guided slidably within a respective guide (48).

2. The device according to Claim 1, **characterized in that** each of said cylindrical guides (48) has a circular cross section.

3. The device according to Claim 2, **characterized in that** each of said retention bodies (54) has a cylindrical external surface (56) with circular cross section terminating with a substantially saddle-shaped engagement portion (58).

4. The device according to any one of the preceding claims, **characterized in that** it comprises three elastic elements (64), each of which is housed in a respective guide (48) and is set in compression between mutually facing surfaces (52, 62) of the guide (48) and of the respective retention body (54).

5. The device according to Claim 4, **characterized in that** said elastic elements (64) consist of helical springs.

6. The device according to Claim 5, **characterized in that** said elastic elements (64) consist of bodies made of elastomeric material.

7. The device according to Claim 1, **characterized in that** the support (12) comprises a base body (68) and a covering element (70) fixed to one another and provided with respective openings (44, 46), through which said tie-rod (14) extends.

8. The device according to Claim 7, **characterized in that** the base body (68) and the covering element (70) each comprise three semicircular seats (72, 74) complementary to one another and defining said guides (48).

FIG. 1

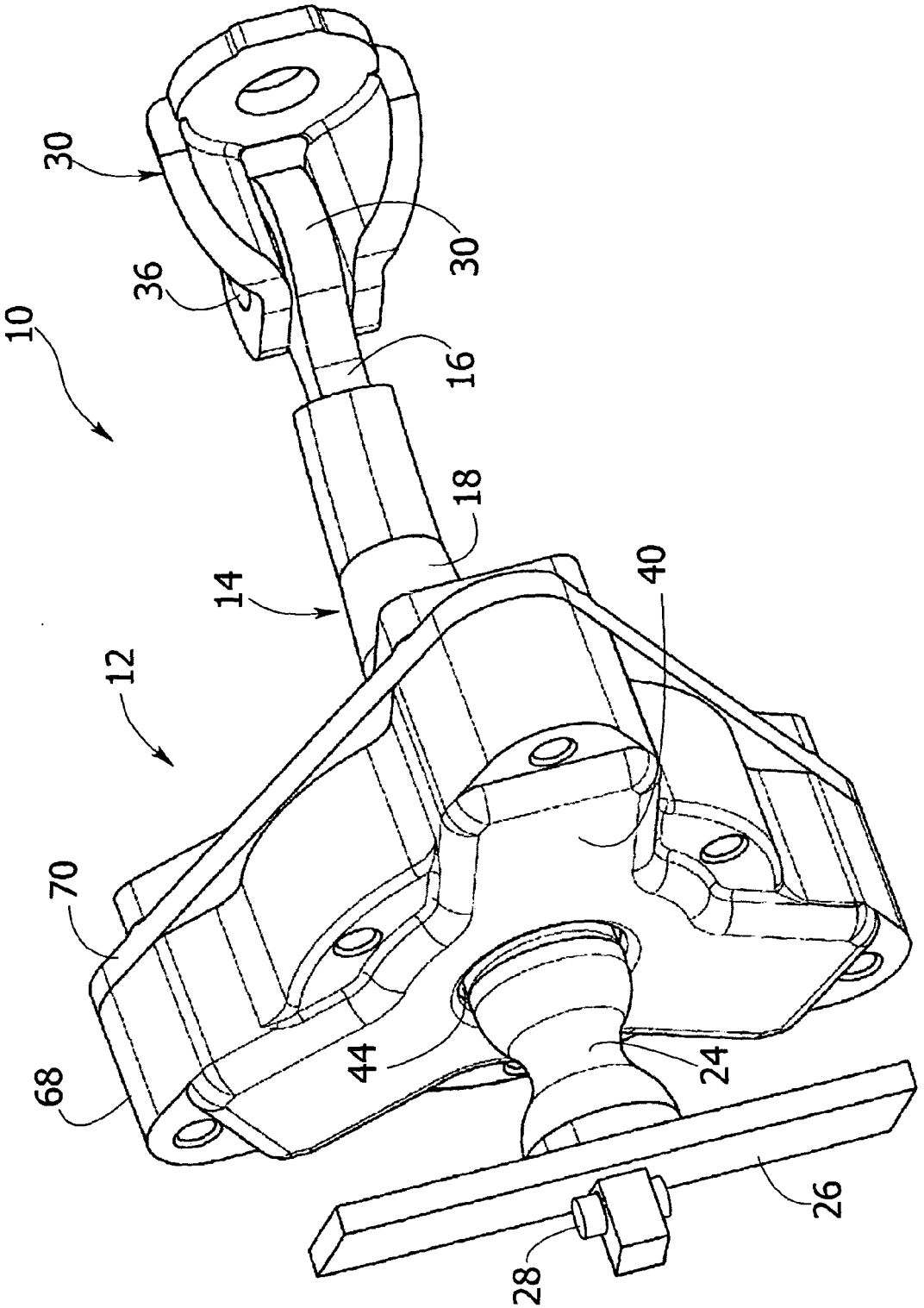

FIG. 2

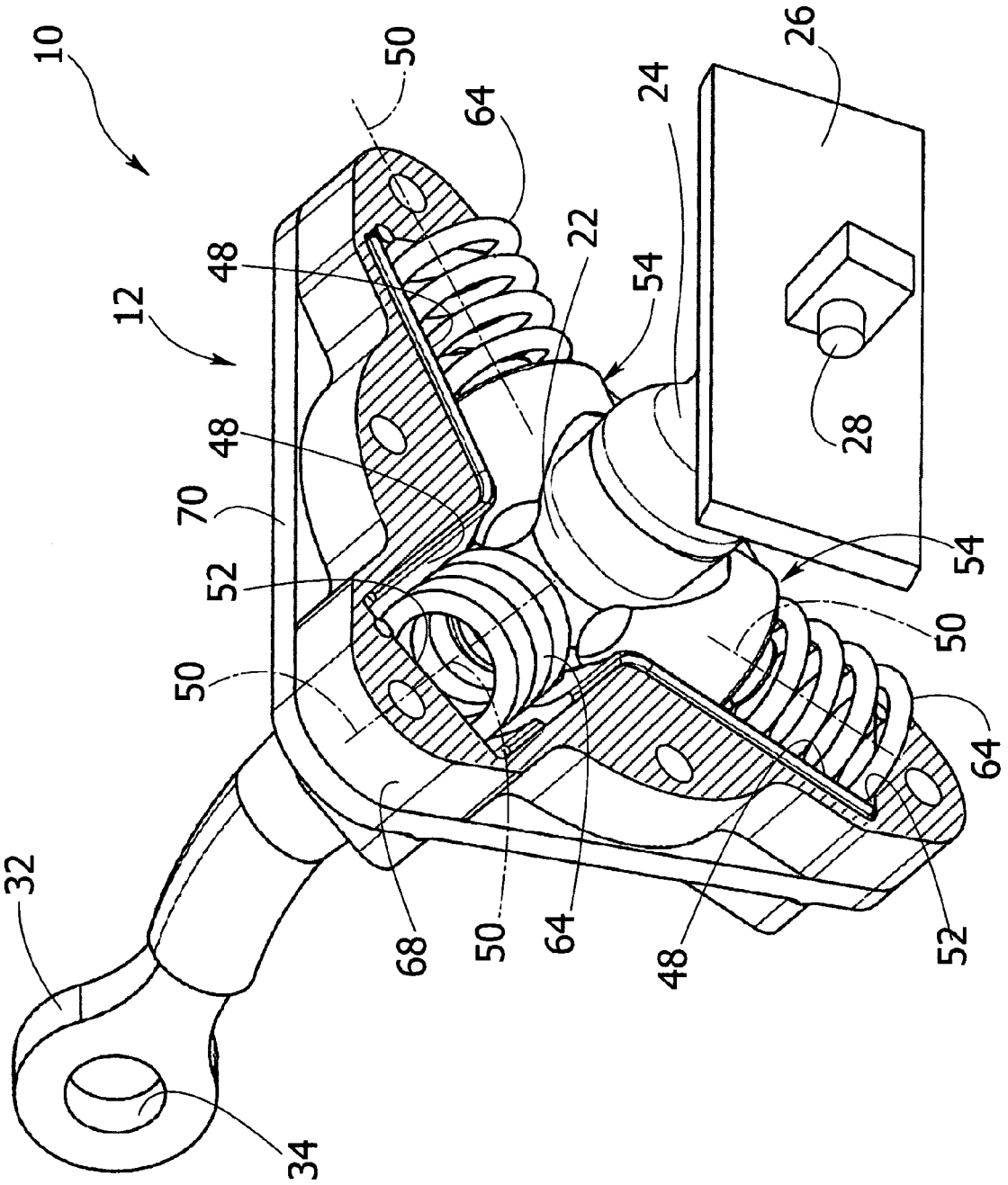

FIG. 3

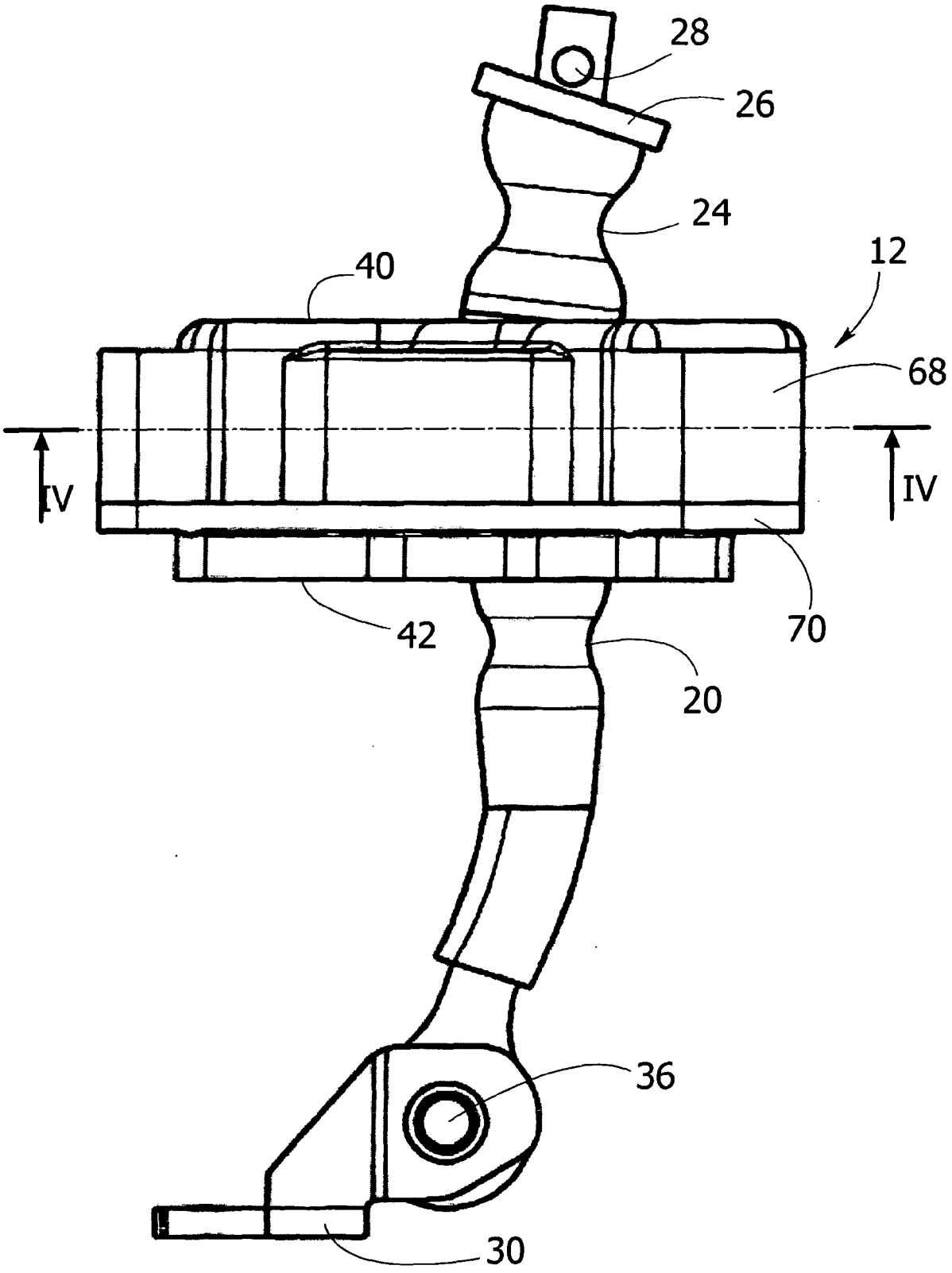

FIG. 5

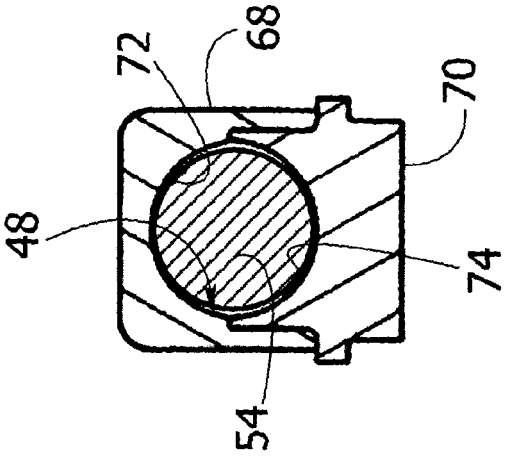
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FIG. 4

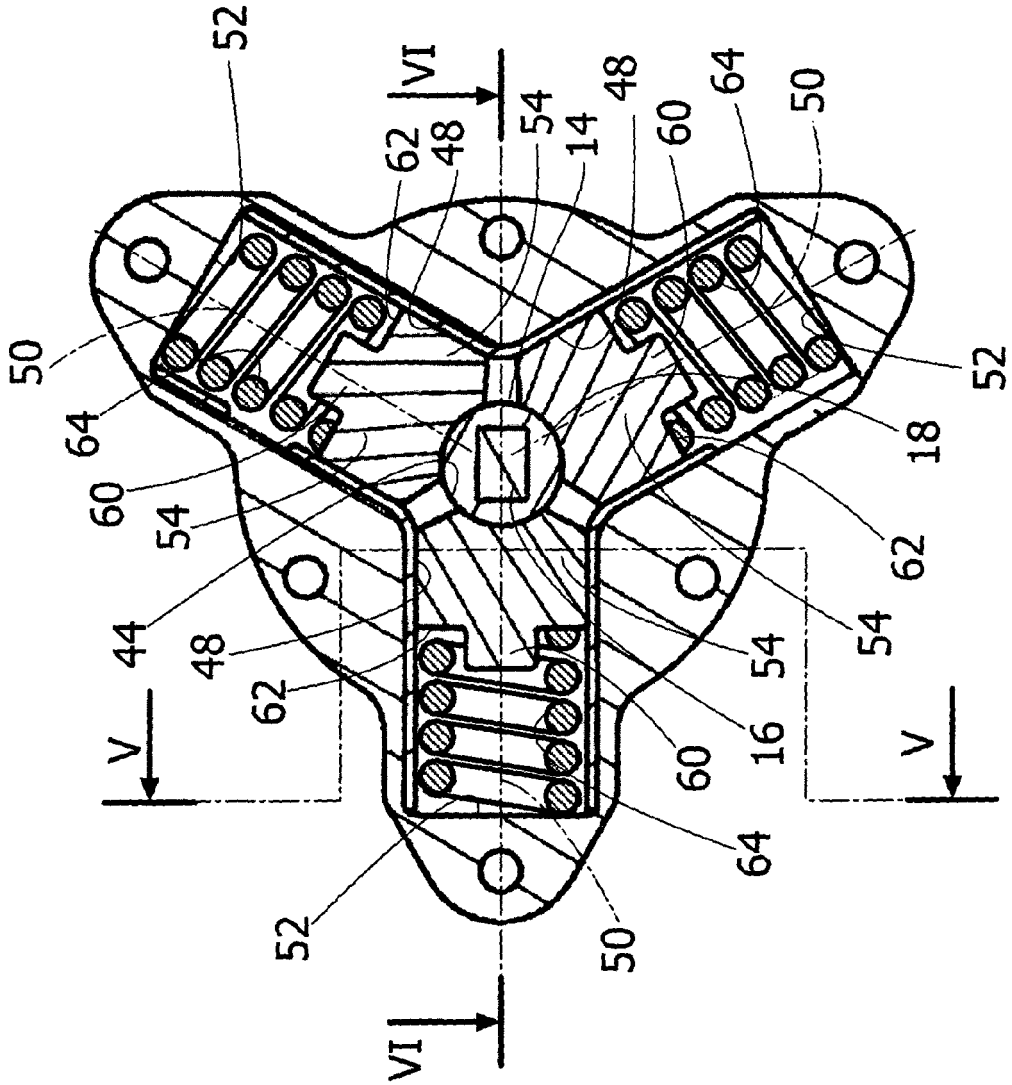
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FIG. 6

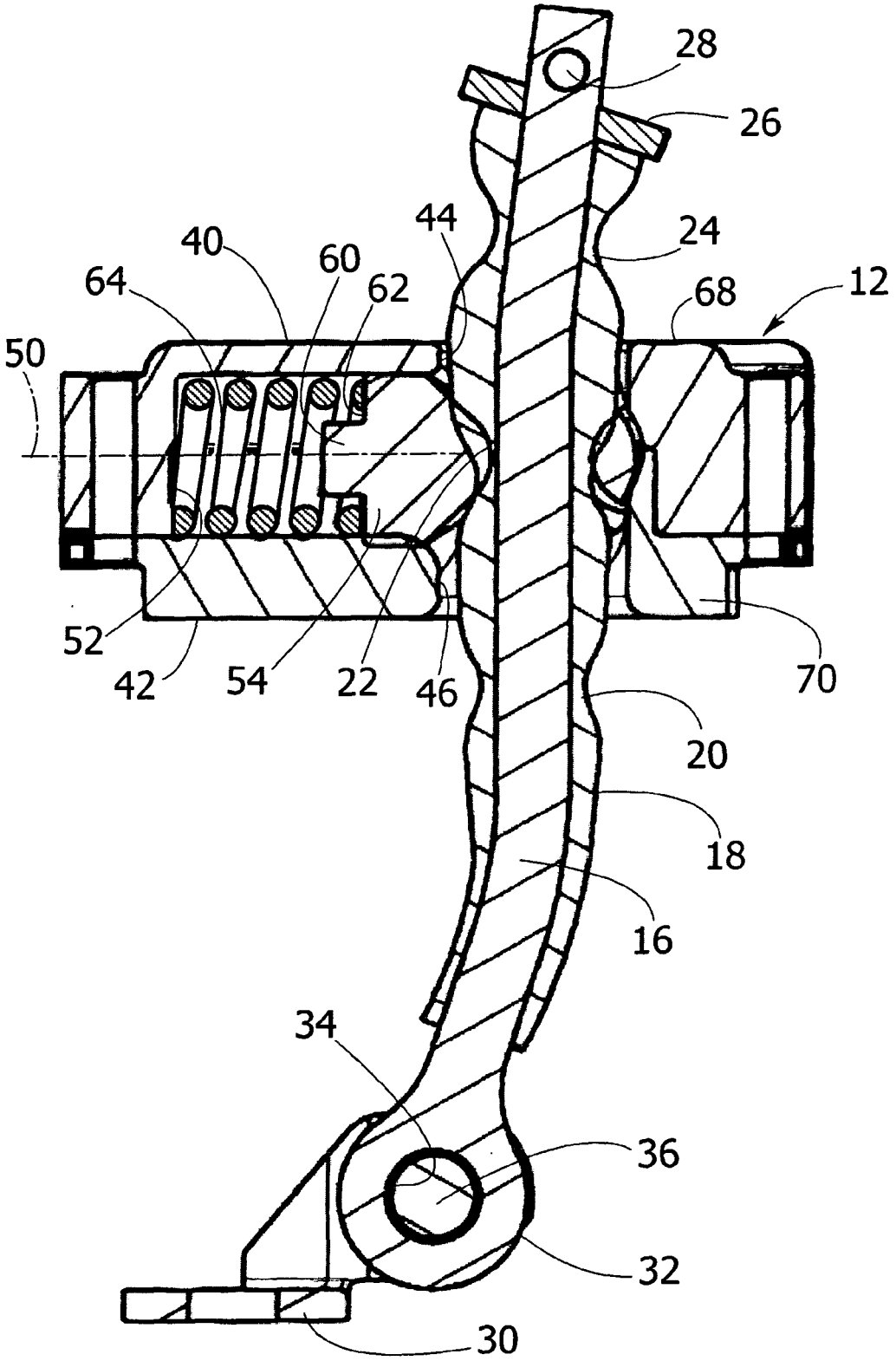

FIG. 7

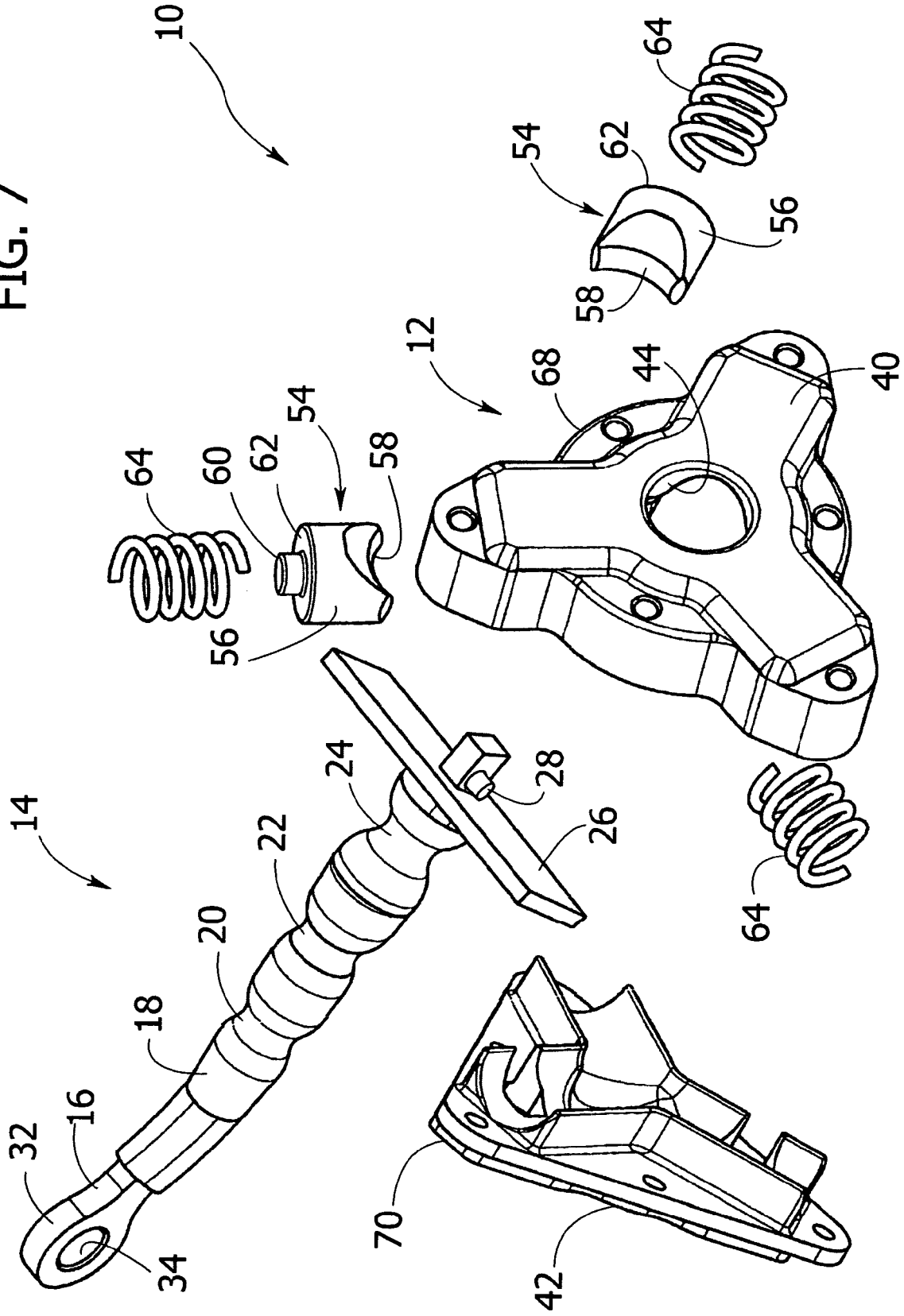
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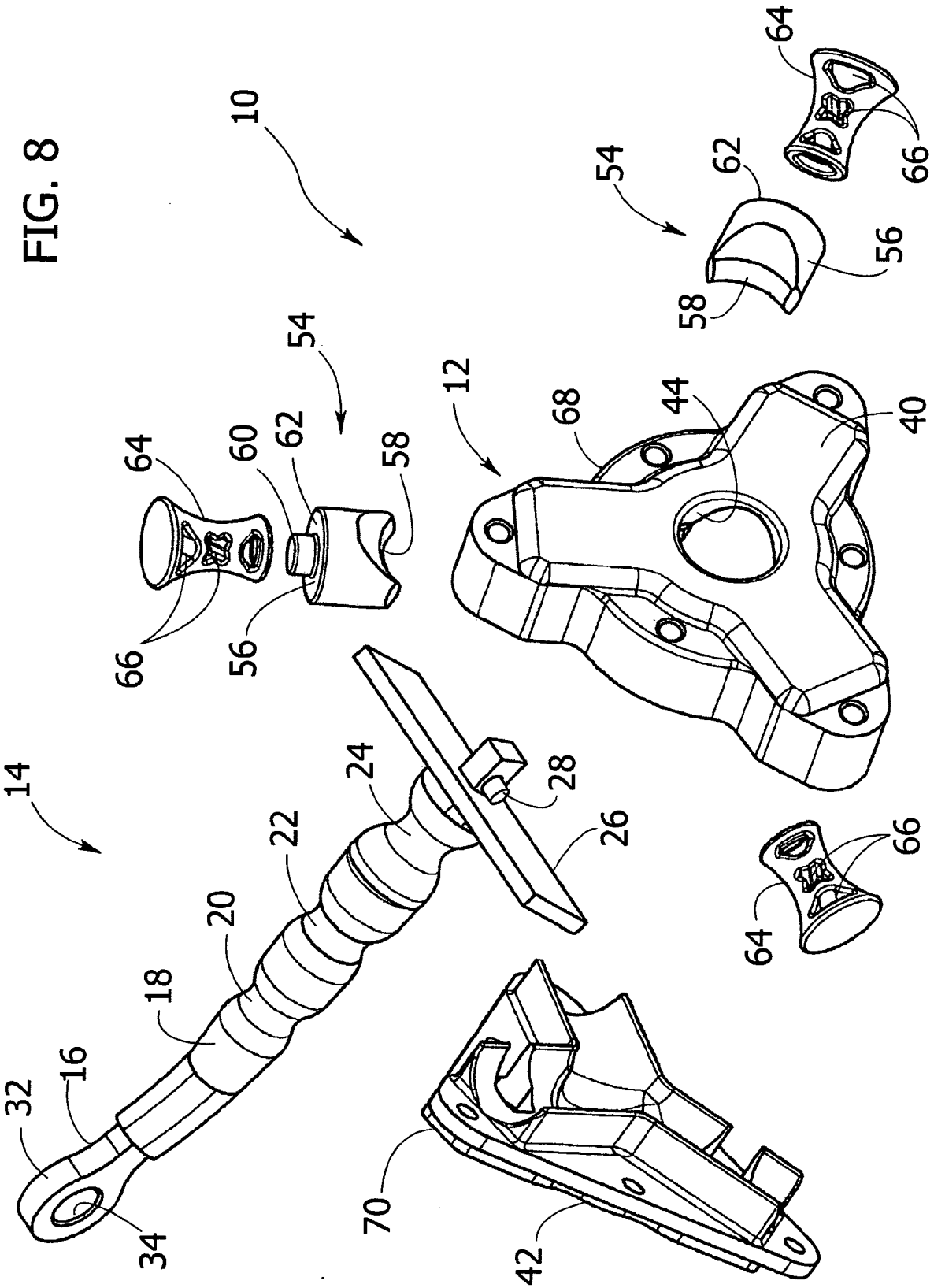
FIG. 8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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5355

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E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 October 2007	WAGNER, A

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