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I-20144 Milano (IT)(54) **System for picking up vehicles, especially in tower garages.**

(57) A system for picking up vehicles in tower garages comprises a horizontally mobile frame (3) that supports two pairs of jaws (6) on each of two opposite sides. Said jaws can be operated with a rotary translational movement in the plane of the frame (3),

so that they come out from the frame (3) and translate parallel to said sides, the frame (3) being shaped so that it can be positioned beneath any vehicle and between the wheels thereof the jaws (6) serving to grip the wheels of the vehicle.

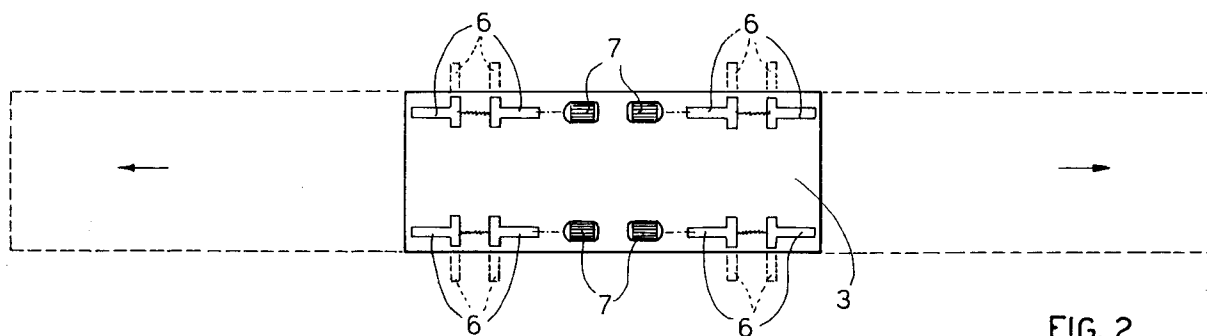


FIG. 2

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The present invention relates to a system for automatically picking up vehicles that have to be placed in appropriate parking areas situated in structures forming so-called automatic car parks.

These automatic car parks, or tower garages, have multiple parking areas situated on a number of floors, extending above or below ground. In order to park a vehicle, it must initially be brought into a pick-up area, after which it will be picked up from said area and carried by the handling system to the floor where it is to be parked.

Various mechanisms are currently in use for transferring a vehicle from the pick-up area to the parking area and vice versa. These mechanisms rely mainly on a system that employs flatbeds equipped with wheels onto which the vehicle must be loaded. These flatbeds are picked up by the handling system and carried to the established floor of the car park. This arrangement requires the use of two flatbeds so that the one occupied by the vehicle can be replaced by the empty one and vice versa, an operation that is slow and laborious and also has the drawback of the overall height given by the flatbed, a height which must be added to that of the vehicle itself.

In another system, the vehicle is gripped and drawn onto a platform that is integral with the handling system, but in this case the vehicle must be in neutral gear, with the handbrake and steering wheel lock off and the wheels straight, conditions which make the system rather impractical.

Another system is that of using racks on which the wheels of the vehicle are made to rest. In this case the handling system is equipped with a comb which enters beneath the racks, picks up the vehicle and sets it down on other racks. In this case too, the vehicle's wheels must be straight and a certain amount of space is needed to allow the vehicle to be lifted.

The aim of the invention is to eliminate the above drawbacks, providing a mechanism that takes the vehicles on their wheels and moves them without any need for additional members such as flatbeds or racks and that also reduces the space required for handling to a few centimetres, allowing vehicles to be picked up even when they are in gear, with the handbrake and steering wheel lock on and the wheels turned.

The mechanism consists of a telescopic system, comprising, for example, a set of frames placed one on top of the other, that can slide on one another and so make translational movements in a one direction in relation to each other. This mechanism allows the upper frame to leave the body of the lower frame and thus position itself beneath the vehicle to be picked up.

For this purpose the upper frame will be of such a size that it can be brought beneath any

vehicle and between the wheels thereof. The symmetry of the system allows movements to be made on the right and on the left.

When the upper frame has moved beneath the vehicle it is possible first to bring out jaws supported by said frame from the frame itself, then to draw them up to the wheels of the vehicle and thus cause them to grip, making the vehicle integral with the frame.

At this point it is sufficient for said frame to be raised a few centimetres to allow the vehicle to be moved from the pick-up area to the parking area and vice versa. The vehicle can be released by carrying out the pick-up operations in reverse.

The lower frame will obviously have to be mounted on a handling system that is capable of transporting it to the pre-established parking area.

It will readily be understood that the fact that the pick-up frame is inserted directly between the wheels of the vehicle rather than beneath the wheels and that the wheels themselves are gripped makes it possible to leave the car in gear and/or with the steering wheel lock on, the handbrake on and the wheels turned, at the same time saving space as regards the height of the parking areas, which is reflected in a considerable saving in the overall height of the entire tower garage since it consists of a plurality of floors.

Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplary and therefore non-limiting embodiment of the invention, illustrated in the attached drawings in which:

Figure 1 is a side view of the telescopic assembly of the system according to the invention, comprising three frames which can slide in relation to each other;

Figure 2 is a plan view of the upper frame, equipped with jaws, that illustrates how these jaws can come out from the frame;

Figure 3 is a schematic illustration, in section along a plane parallel to the plane of figure 2, of a jaw inside its guide, together with the motor that allows it to be operated;

Figure 4 is a section along the line IV-IV of Figure 3, that illustrates in particular how a support that can slide inside a guide engages with the jaw.

With reference to Figure 1 in particular, a slide frame 1, integral with the handling system (not illustrated), supports a gear wheel 10 that meshes with a rack 8 fixed to an intermediate frame 2 that can move in relation to said frame 1 thanks to guides or supporting wheels (not illustrated).

Positioned on said intermediate frame 2 are pulleys 9 which, thanks to a pair of cables 4, fixed at one end to said frame 1 and at the other end to an upper frame 3, allow the latter to slide in relation to said intermediate frame and in the same direction of movement. A chain system can be used as an alternative to the cables.

This mechanism allows the upper frame 3 to leave the body of the slide frame 1 and position itself between the wheels of any vehicle placed along the same axis as said frame 1, the frame 3 being of a height (e.g. 10 cm) and width (e.g. 100 cm) that are smaller, respectively, than the space normally existing between the ground and the bottom of the vehicles and the width normally existing between one wheel and the other of the same axle.

Thanks to the symmetry of the system, the movements can be made to the left or to the right of the frame 1.

With reference to figure 2 in particular, when the upper frame 3 has been positioned beneath the vehicle by means of the motors 7, the jaws 6 are first brought out from the frame 3, by means of rotation, and then said jaws 6 are drawn up to the wheels of the vehicle by travelling horizontally along the sides of the frame 3, making the vehicle integral with the frame 3.

At this point the frame 1 and consequently the frames 2 and 3, need only be raised a few centimetres for the vehicle to be moved. By mounting the frame 1 on a system capable of moving it, the vehicle can be carried to its designated parking area and released there by carrying out the pick-up operations in reverse.

Figure 3 shows a section, along a plane parallel to the plane of the frame 3, of a detail of one of said jaws 6 inside a slide guide 5. In the resting position the jaw 6 is parallel to the longest side of the frame 3 and completely inside said guide 5.

A support 4, perpendicular to the plane of the frame 3 and engaging said jaw 6 by means of a pin 40, slides inside the guide 5. A motor 7 operating a worm screw 11 which engages with a female thread 20 provided in the support 4 at right angles to the axis of the jaw 6 imparts a horizontal translational movement to said support 4, in the direction of said worm screw 11. Starting from the resting position of the jaw 6, the translation of the support 4 causes firstly the extraction of the jaw 6 from the guide 5 and hence from the frame 3, thanks to the particular U-shape of the area 12 of said guide 5, initially due to the engagement of a pivot 13 of the jaw with the rear side wall 16 of the guide 5, and subsequently a translation of the jaw 6 parallel to the longest side of the frame 3, into its working position. Said jaws are thus brought up to the wheels of the vehicle.

In order to bring the jaws 6 away from the wheels of the vehicle and thus allow its release, the direction of rotation of the motor 7 and thus of the worm screw 11 is reversed, causing translation of the support 4, and thus of the jaw 6, in the opposite direction to that used to bring the jaw 6 up to the wheel. By means of the pivot 13, which is conveniently cylindrical in shape, the jaw 6 strikes against a protruding front edge 14 of the U-shaped area 12 of the guide 15 and is thus forced to rotate (in an anti-clockwise direction in figure 2) and move inside and parallel to the guide 5.

Figure 4, which is a section along the line IV-IV in figure 3, shows in greater detail the way in which said support 4 engages with said jaw 6. The guide 5 is box-shaped, with the side 14 projecting inwards, so that the latter forms a guide for the pivot 13.

In order to obtain equal opposite movements of the jaws 6 of each pair, portions of the driving worm screw 11 can, for example, be provided with opposite threads. Alternatively, distinct worm screws 11, driven by separate motors 7, can be provided. It is also clear that instead of being driven by a screw and female thread with an electric motor, any other linear actuator could be provided, for example of a hydraulic or pneumatic type.

Claims

1. A system for picking up vehicles, particularly in tower garages, comprising a horizontally mobile frame (3) to support the vehicle, characterized by the fact that said frame (3) is part of a telescopic assembly (1, 2, 3) designed to bring it from a position external to the vehicle to a position below the vehicle and between the wheels thereof and vice versa, and by the fact that said frame (3) is provided with means for gripping the wheels of the vehicle above their area of contact with the ground.
2. A system according to claim 1, characterized by the fact that said means (6) consist of pairs of jaws driven with a rotary translational movement in the plane of said frame (3), so as to come out from the frame and translate parallel to the longitudinal sides of the same and in the opposite direction, in order to grip a respective wheel of the vehicle.
3. A system according to claim 1 or 2, characterized by the fact that said jaws (6) are driven by motors (7) through the engagement of a worm screw (11), keyed on the axle of said motors (7), with a female thread (2) provided in a support (4) for a respective jaw (6).

4. A system according to claim 3, characterized by the fact that said support (4) is equipped with a pin (40) that engages with the respective jaw (6), allowing the latter to rotate with respect to said support (4) and to translate. 5
5. A system according to claim 3 or 4, characterized by the fact that said support (4) slides inside a respective guide (5) positioned on a corresponding longitudinal side of the frame (3). 10
6. A system according to any one of claims 3 to 5, characterized by the fact that the parts of said jaws (6) that engage with said supports (4), are equipped with pivots (13) that abut against opposite sides (14, 16) of the areas (12) of said guides (5) allowing said jaws (6) to rotate and retract into said guide (5), or come out from the guides. 15
20
7. A system according to any of the previous claims, characterized by the fact that said worm screw (11) has portions of opposite thread to cause equal opposite movements of the jaws (6) in each pair. 25
8. A system according to any of the claims from 1 to 7, characterized by the fact that distinct worm screws (11) are provided which are driven independently by their respective motors (7), for operation of the jaws (6) in each pair. 30
9. A system according to claim 1 or 2, characterized by the fact that said jaws (6) are operated by actuators of a hydraulic, pneumatic or similar type. 35
10. A system according to any one of the previous claims, characterized by the fact that said set of telescopic frames (1, 2, 3) allows the outermost or upper frame (3) to be moved in both directions. 40
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11. A system according to any one of the previous claims, characterized by the fact that said set of telescopic frames (1, 2, 3) is operated by a gear system (10, 8) and/or with a cable (9, 4) or chain transmission. 50

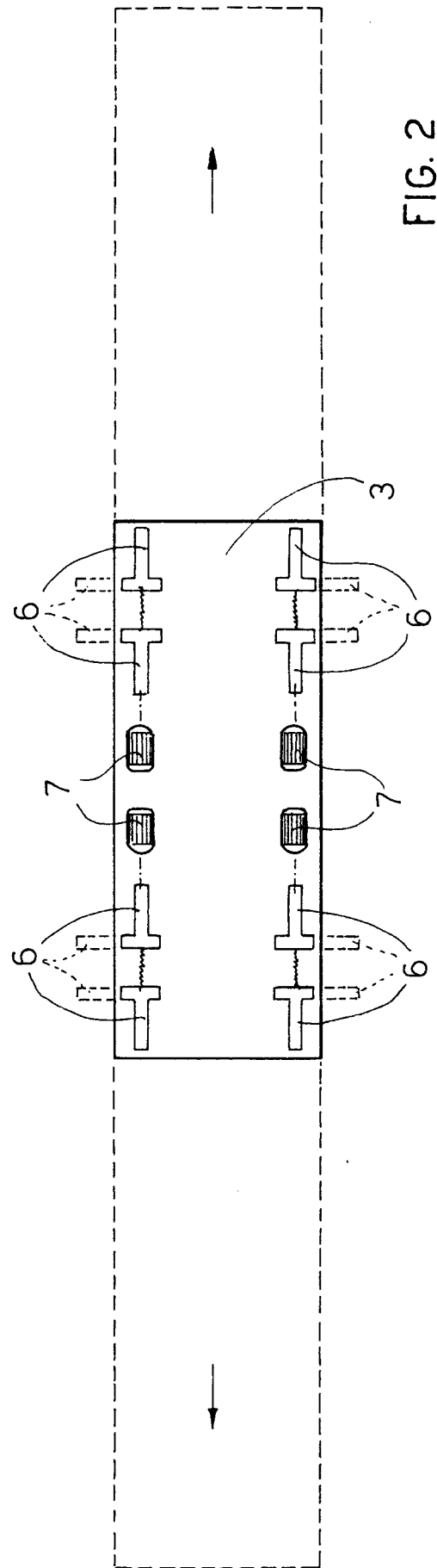
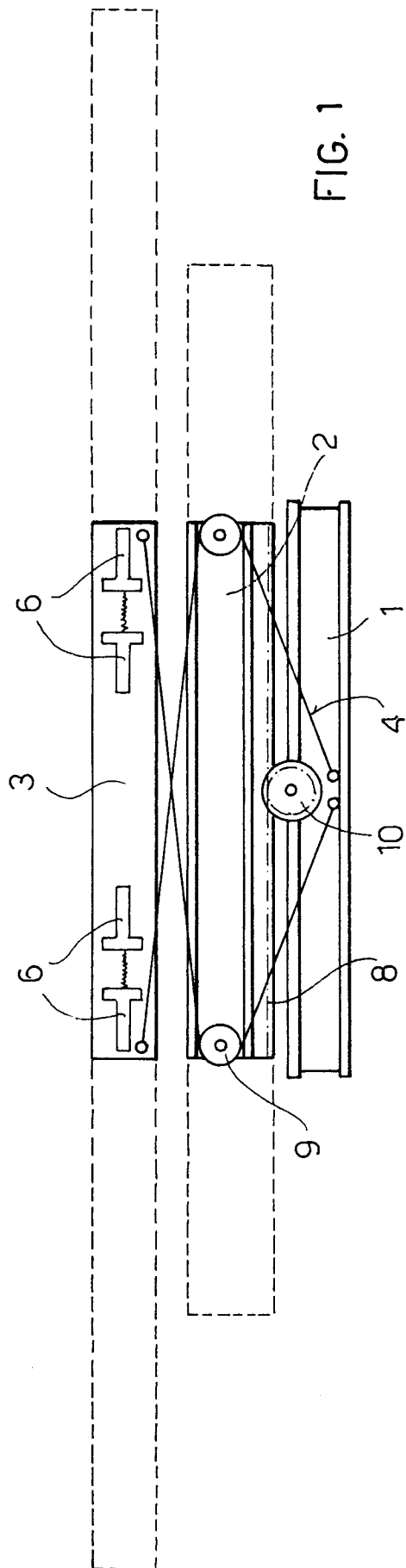


FIG. 3

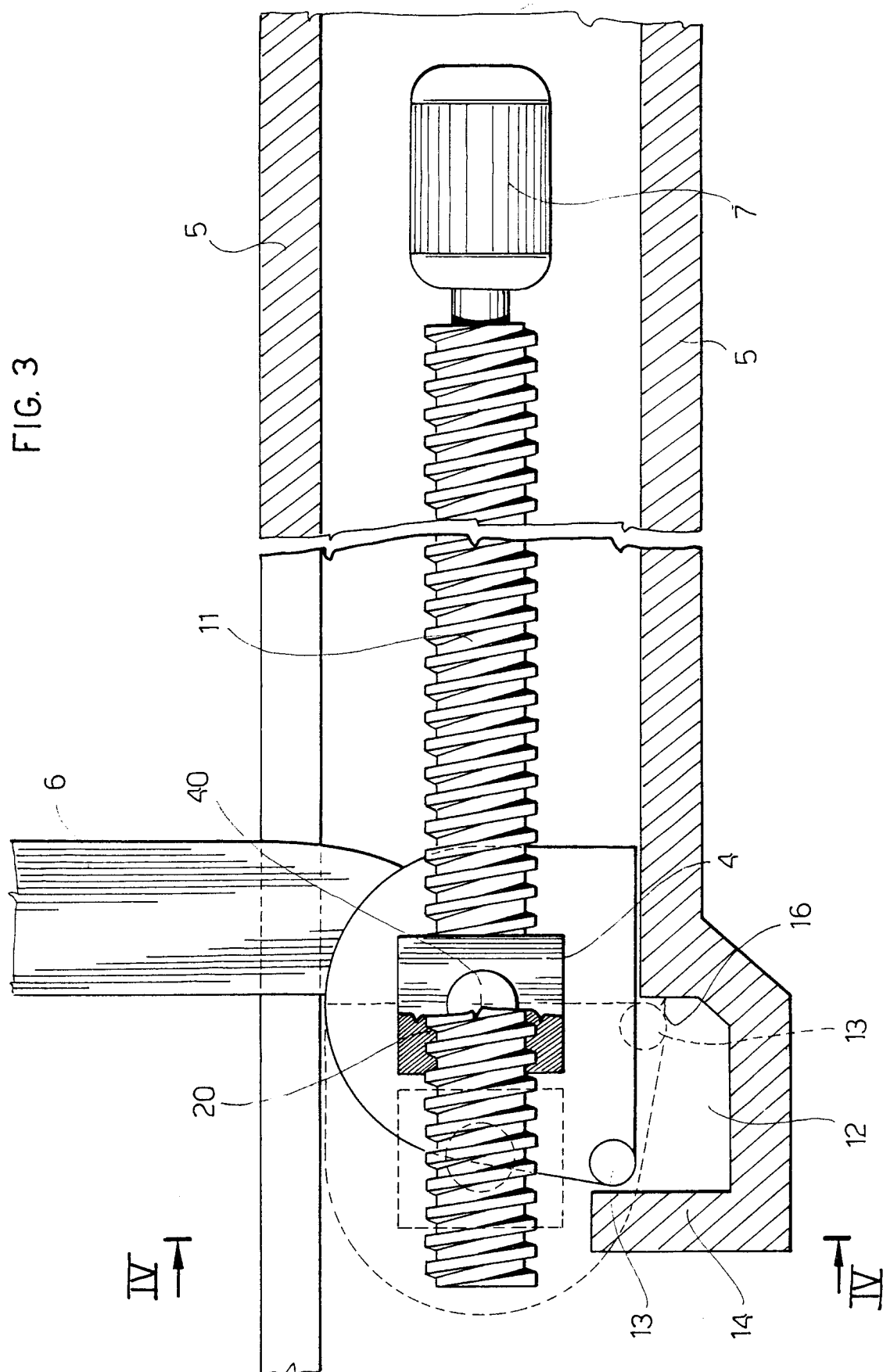
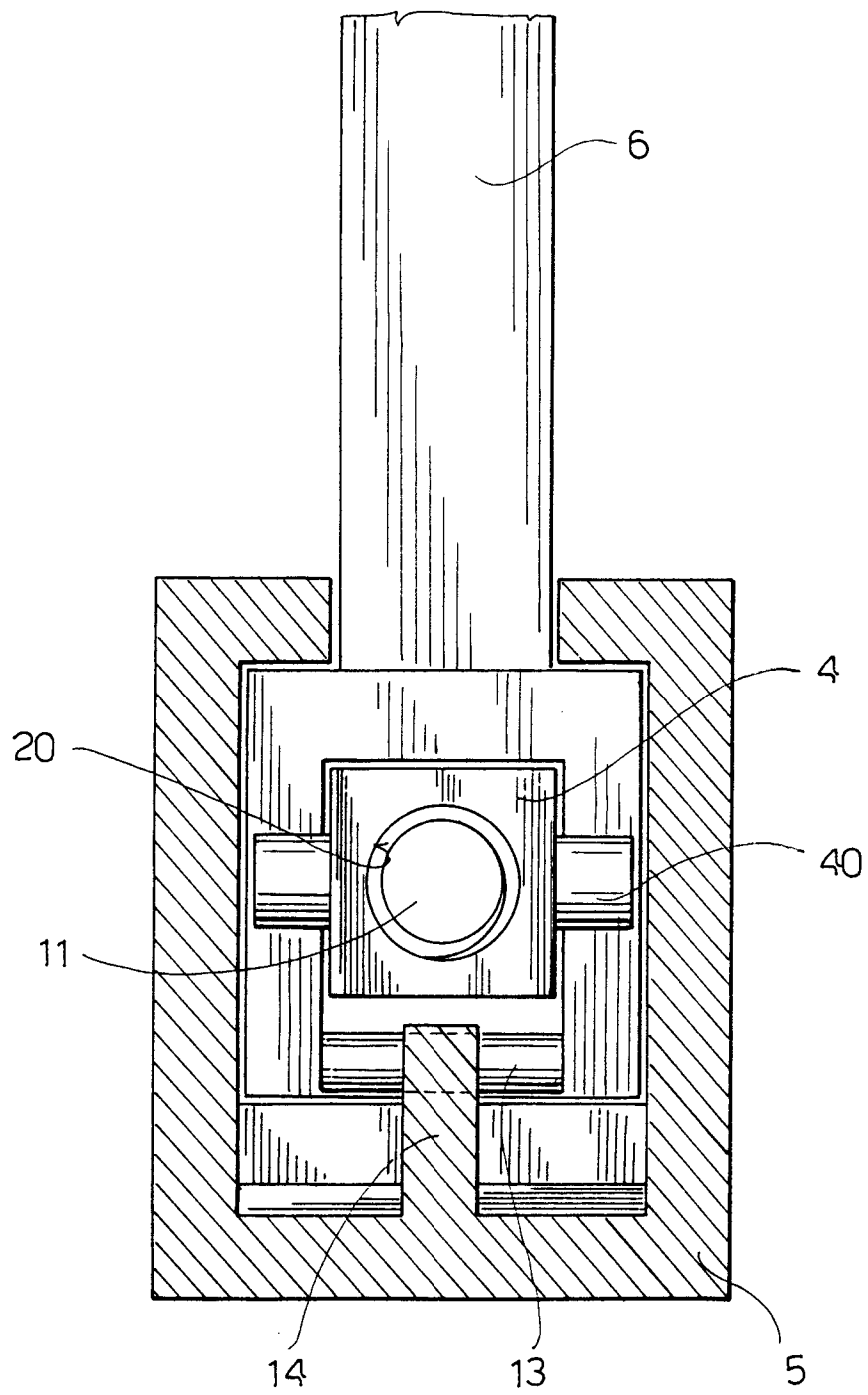


FIG. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 4798

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-3 318 469 (BIGLER) * column 2, line 16 - column 4, line 49; figures 5,15 * ---	1,2,9-11	E04H6/18
A	DE-B-10 45 075 (AMANN) * the whole document * ---	1-5,7, 9-11	
A	GB-A-2 267 903 (NKK CORPORATION) * page 5, line 31 - page 8, line 10; figures 1,2 * ---	1-5	
A	DE-A-42 23 646 (NKK CORPORATION) * column 11, line 45 - column 12, line 63; figure 17 * -----	1,10,11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E04H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 June 1995	Examiner Vrugt, S
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