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(54) Stabilizing system

(57) It refers to a stabilizer (10) adapted to preferably support or lift a vehicle from the ground, comprising:
- a first extensible element (12, 14) adapted to be fixed on the vehicle;
- a second extensible element (16, 18) adapted to be connected with the first element (12, 14);
- moving means (36, 40) adapted to extend the second element (16, 18);

an end of said first element (12, 14) or second element (16, 18) resting on the ground so as to support or lift the vehicle and the extension direction of the first element (12, 14) being not parallel to the extension direction of the second element (16, 18).

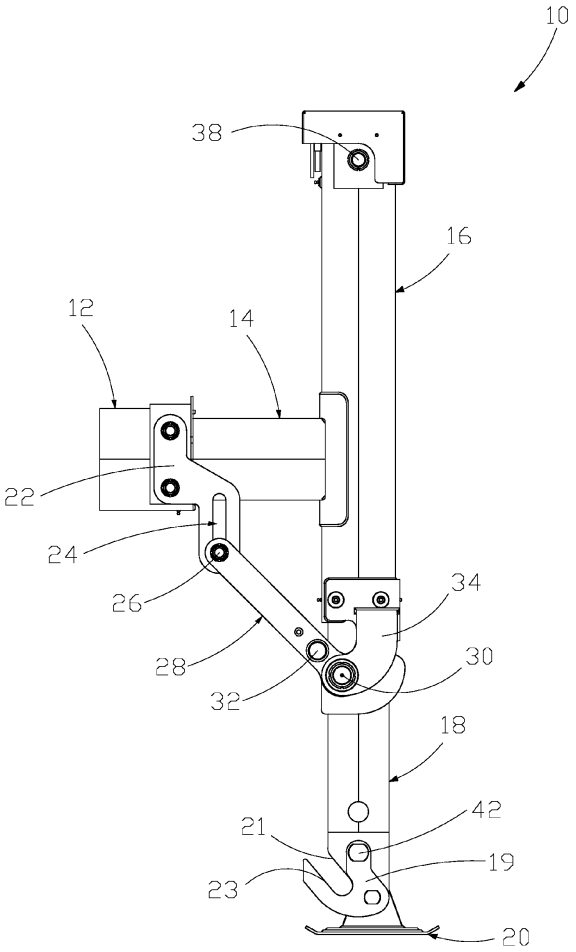

Fig. 1

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Description

[0001] The present invention refers, in general, to a stabilizing system, namely, a stabilizer adapted to be mounted on vehicles such as aerial platforms. More particularly, the present invention refers to a stabilizer having particular features and adapted to be extracted and reinserted laterally and automatically.

[0002] As is known, there exist several typologies of mechanical devices, commonly called stabilizers, adapted to support the whole mass of the vehicle on which said stabilizers are fixed. The stabilizers are usually used two by two, a pair of stabilizers being placed in the front of the vehicle and the other pair of stabilizers being placed in the rear of the vehicle.

[0003] Each stabilizer, front or rear stabilizer, usually comprises a fixed beam, integral with the frame of the vehicle. The frame of the vehicle comprises another beam which is movable and is extracted in respect to the fixed beam. A telescopic element is connected with the ends of the beams, such telescopic element being orthogonal or inclined to the vertical.

[0004] Usually, said telescopic elements are extracted by utilizing a hydraulic jack. Once the telescopic elements have been extracted, they form four supports to support the whole weight of the vehicle on the ground.

[0005] A stabilizer according to the prior art comprises a first mechanism for a lateral extraction of the movable beam and a second mechanism for a vertical extraction of the telescopic element comprising a supporting foot.

[0006] Each mechanism utilizes an actuator, usually a hydraulic jack, fed by a fluid flow and controlled electronically.

[0007] Each hydraulic jack needs an electronic control and all the fittings that manage the control hydraulics, such as hydraulic pipes, stop valves, distributors and so on.

[0008] Consequently, stabilizers of this typology according to the prior art are very complex as regards the structure and the control, which involves high costs and an insufficient reliability level.

[0009] An aim of the present invention is, therefore, to reduce the complexity of a positioning system for vehicle stabilizers.

[0010] A further aim of the present invention is to obtain a positioning system for vehicle stabilizers involving lower costs of production.

[0011] The above aims and further ones are reached according to the invention through a stabilizer adapted to preferably support or lift a vehicle from the ground, comprising a first extensible element, adapted to be fixed on the vehicle, a second extensible element, adapted to be connected with the first element, and moving means adapted to extend the second element; an end of said first element or second element resting on the ground so as to support or lift the vehicle, and the extension direction of the first element being not parallel to the extension direction of the second element. The stabilizer is characterized in that it comprises converting means adapted to convert at least a part of the extension of the second element in an extension of the first element so that the second element extends and translates at the same time owing to the extension of the first element.

[0012] Through this configuration it is sufficient that the moving means such as a hydraulic cylinder or another actuator acts only on one of the two extensible elements since the extension of the other extensible element is obtained through converting means to reduce both the moving means and the actuating devices for said moving means. Thus, the stabilizer according to the present invention is simpler and needs less maintenance.

[0013] Advantageously, the converting means of the stabilizer according to the invention comprise a connecting rod which is pivoted at a first end with the second element so as to pivot and is pivoted at the other opposite end with the first element so as to pivot and translate; said connecting rod comprising a cam, said first element or said second element comprising a guide in which said cam moves so that during the extension of the second element the cam is compelled to move in the guide on making the connecting rod pivot and the pivoted connecting rod causes the extension of the first element.

[0014] The converting means consist, therefore, of a mechanism which is provided with a connecting rod which connects the first extensible element with the second extensible element. When one of the two extensible elements is extended, the connecting rod is compelled to rotate owing to the conformation of the guide in which the cam, fixed on the conn3ecting rod, is moved.

[0015] As a result of this, the rotation of the connecting rod causes the extension of the other extensible element, as well.

[0016] Advantageously, the connecting rod is connected with the second extensible element so as to rotate and can rotate and translate relative to the first extensible element since the first element comprises a bracket in which an elongated hole is obtained and a first pin, fixed on the first end of the connecting rod, moves in said elongated hole.

[0017] In particular, the direction of the elongated hole is parallel to the direction of extension of the second element.

[0018] Advantageously, the first element comprises a first beam to be fixed on the vehicle and a second beam to be connected with the first beam so as to slide, the bracket being fixed on the first beam.

[0019] Likewise, the second element comprises a first structural, fixed on the free end of said second beam and a second structural, connected with the first structural so as to slide, the free end of said second structural being in touch with the ground.

[0020] Besides, the guide in which the cam, fixed on the connecting rod, slides, is fixed on the second structural.

[0021] The connecting rod is pivoted on the first structural so as to pivot.

[0022] A first inclined profile is provided at the free end of the second structural and a hook is fixed on the free end of the second structural and comprises a second inclined profile which is essentially parallel to the first profile. Said first profile and said second profile form the guide in which the cam is moved. Advantageously, the free end of the first element or second element comprises a foot, adapted to rest on the ground, said foot being arranged orthogonally to the ground when the first element or second element is not extended, in order to protect the element with which it is connected.

[0023] Further features and details of the invention will be better understood from the following specification, which is given as a non-limiting example, as well as from the accompanying drawings wherein:

Fig. 1 is a front view of a stabilizer according to the invention, arranged in an opened configuration;
Fig. 2 is another front view, partially in section, of the stabilizer in Figure 1, arranged in an intermediate configuration;
Fig. 3 is a detail, in section, of a stabilizer according to the invention, arranged in a closed configuration;
Figg. 4, 5, 6 are front views of a stabilizer according to the invention, arranged in a closed configuration, an intermediate configuration and an opened configuration, respectively;
Fig. 7 is a rear view of a stabilizer according to the invention, arranged in an opened configuration.

[0024] With reference to the accompanying drawings, in particular Figure 1, number 10 denotes a stabilizer which comprises both a fixed beam 12, which is adapted to be fixed on the frame of a vehicle (not visible in the figure), and a movable beam 14 on which a vertical element 16 is fixed. In turn, the vertical element 16 comprises an inner element 18.

[0025] A foot 20 is connected with the free end of the inner element 18 so as to rotate and a hook 19 showing an inner profile 23 is fixed on said free end. Besides, the free end of the inner element 18 shows an inclined profile 21 which is essentially parallel to the profile 23 of the hook 19.

[0026] A guide 22 is fixed on the fixed beam 12 with known means and comprises an elongated hole 24 in which a first pin 26 slides, the first pin 26 being connected with an end of a connecting rod 28.

[0027] A second pin 30 is connected with the opposite end of the connecting rod 28. A control pin 32 is fixed between the first pin 26 and the second pin 30.

[0028] The second pin 30 connects the connecting rod 28 with a support 34 so as to rotate, the support 34 being fixed on the vertical element 16.

[0029] As visible in Figure 2, a hydraulic jack 36 is housed in the inside of the vertical element 16. The cylinder of the hydraulic jack 36 is connected through a pin 38 with the vertical element 16. The rod 40 (visible in Figure 3) of the hydraulic jack 36 is fixed through a pin 42 on the inner element 18.

[0030] The working of the stabilizer is described as follows:

As visible in Figure 4, the stabilizer 10 in the starting position is in its closed configuration in which the connecting rod 24 is parallel to the vertical element 16 and the element 18, not visible, is completely retracted in the inside of the vertical element 16.

[0031] When the hydraulic jack 36 is actuated, the rod 40 pushes the inner element 18 to the outside.

[0032] The inclined profile 21 of the inner element 18 pushes the control pin 32 of the connecting rod 28 so that the connecting rod 28 rotates round the second pin 30 until the control pin 32 is no more in touch of the inclined profile 21. During the rotation of the connecting rod 28 round the second pin 30, the first pin 26 slides in the elongated hole 24 of the guide 22, as represented in Figure 5. The rotation of the connecting rod 28 provokes a horizontal translation of the second pin 30.

[0033] Consequently, since the vertical element 16 is constrained to the second pin 30, the vertical element 16 is compelled to space out from the fixed beam 12 so that the movable beam 14 goes out of the fixed beam 12.

[0034] In this way, a short run of the inner element 18 allows an automatic extraction of the movable beam 14.

[0035] As visible in Figure 6, when the control pin 32 has gone out of the inclined profile 21 of the inner element 18, the inner element 18 is free to descend for the necessary run, for instance to bring the foot 20 in touch of the ground S and then to lift the vehicle to the wished height.

[0036] The control pin 32 remains in the proximity or in touch of the sidewall of the inner element 18 on acting as a safety retainer preventing an unwished reentering of the movable beam 14.

[0037] The stabilizer 10, which is now in its opened configuration, has an only possibility of movement, namely a further descent or ascent of the inner element 18.

[0038] The return of the stabilizer 10 to the closed configuration occurs by repeating the above mentioned steps backwards.

[0039] The hydraulic jack 36 recalls its rod 40 back so that the inner element 18 reenters in the vertical element 16 and the hook 19 comes in contact with the control pin 32.

[0040] The further ascent of the inner element 18 compels the control pin 32 to follow the profile 23 of the hook 19 so that the connecting rod 28 is put into rotation. Thus, the connecting rod 28 returns to the initial position as visible in Figure 4, this initial position being parallel to the vertical element 16.

[0041] The so-described stabilizer allows a considerable constructive simplification in respect to the stabilizers of the known art since in the known stabilizers, two controlled actuations are utilized, in general hydraulic ac-

tuations, to allow at first the horizontal extraction and then the vertical extraction of the stabilizer while the stabilizer 10 according to the present invention has an only controlled actuation allowing both the horizontal extraction and the vertical extraction.

[0042] Besides, the control pin 32, which converts the vertical motion of the hydraulic jack 36 into a horizontal motion of the movable beam 14, acts as a stop in the opened configuration and avoids an unwished reentering of the movable beam 14.

[0043] In the stabilizers according to the known art, the stopping function was obtained by utilizing a stop valve acting on the hydraulic jack, such hydraulic jack being dedicated to the only horizontal extraction of the movable beam in respect to the fixed beam.

[0044] The machines according to the known art utilize, therefore, two hydraulic jacks instead of one hydraulic jack as in the present invention.

[0045] As a result of this, the number of the accessory devices actuating the hydraulic jacks, such as hydraulic pipes, stop valves, pins, distributors and so on is reduced.

[0046] Besides, the mechanical system according to the present invention is in general more reliable than other systems reaching the same aim but with the addition of electric and hydraulic parts as in the systems of the prior art.

[0047] In addition, variants and further constructive modifications are possible but are to be considered as included in the scope of protection of the invention; for instance, instead of a hydraulic jack it is possible to utilize an electric actuator or another equivalent device.

Claims

1. Stabilizer (10) adapted to preferably support or lift a vehicle from the ground, comprising:

- a first extensible element (12, 14) adapted to be fixed on the vehicle;
- a second extensible element (16, 18) adapted to be connected with the first element (12, 14);
- moving means (36, 40) adapted to extend the second element (16, 18);

an end of said first element (12, 14) or second element (16, 18) resting on the ground so as to support or lift the vehicle and the extension direction of the first element (12, 14) being not parallel to the extension direction of the second element (16, 18),
characterized in that the stabilizer comprises converting means (19, 21, 22, 24, 28, 30, 32) adapted to convert at least a part of the extension of the second element (16, 18) in an extension of the first element (12, 14) so that the second element (16, 18) extends and translates at the same time owing to the extension of the first element (12, 14).

2. Stabilizer (10) according to claim 1, wherein said converting means comprise a connecting rod (28) which is pivoted at a first end with the second element (16, 18) so as to pivot and is pivoted at the other opposite end with the first element (12, 14) so as to pivot and translate, said connecting rod (28) comprising a cam (32), said first element (12, 14) or said second element (16, 18) comprising a guide (21, 23) in which said cam (32) moves so that during the extension of the second element (16, 18) the cam (32) is compelled to move in the guide (21, 23) on making the connecting rod (28) pivot and the pivoted connecting rod (28) causes the extension of the first element (12, 14).

3. Stabilizer (10) according to claim 2, wherein the first element (12, 14) comprises a bracket (22) in which an elongated hole (24) is obtained and a first pin (26), fixed on the first end of the connecting rod (28), moves in said elongated hole (24).

4. Stabilizer (10) according to claim 3, wherein the direction of the elongated hole (24) is parallel to the direction of extension of the second element (16, 18).

5. Stabilizer (10) according to claim 3 or 4, wherein said first element comprises a first beam (12) to be fixed on the vehicle and a second beam (14) to be connected with the first beam (12) so as to slide, the bracket (22) being fixed on the first beam (12).

6. Stabilizer (10) according to claim 5, wherein said second element comprises a first structural (16) fixed on the free end of said second beam (14) and a second structural (18) connected with the first structural (16) so as to slide, the free end of said second structural (18) being in touch with the ground.

7. Stabilizer (10) according to claim 6, wherein the guide (21, 23) is fixed on the second structural (18).

8. Stabilizer (10) according to claim 6 or 7, wherein the connecting rod (28) is pivoted on the first structural (16) so as to pivot.

9. Stabilizer (10) according to any of claims 6 to 8, wherein a first inclined profile (21) is provided at the free end of the second structural (18) and wherein a hook (19) is fixed on the free end of the second structural (18) and comprises a second inclined profile (23) which is essentially parallel to the first profile (21),said first profile (21) and said second profile (23) forming the guide in which the cam (32) moves.

10. Stabilizer (10) according to any of the preceding claims, wherein the free end of the first element (12, 14) or second element (16, 18) comprises a foot (20) adapted to rest on the ground, said foot (20) being

arranged orthogonally to the ground when the first element (12, 14) or second element (16, 18) is not extended.

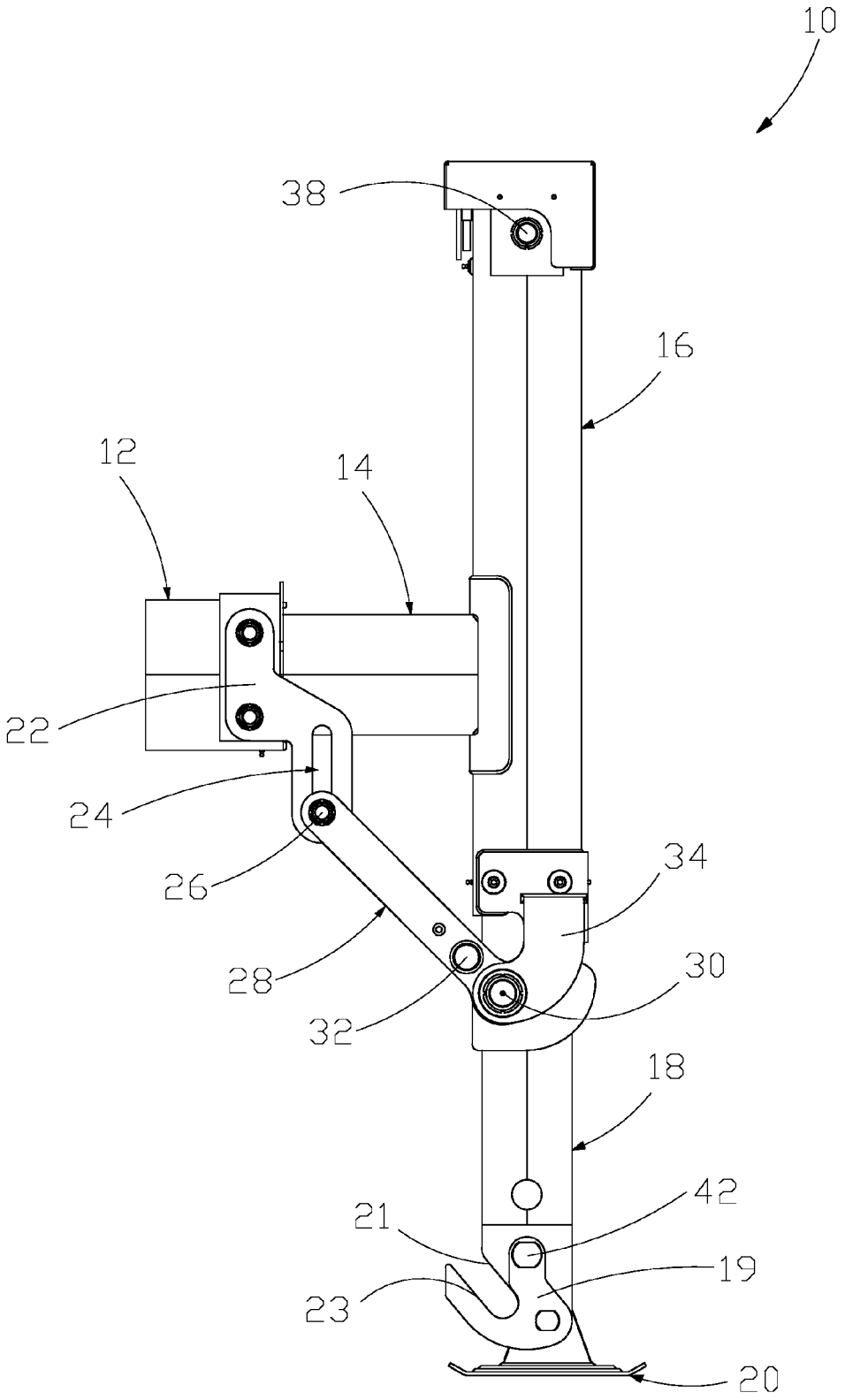

Fig. 1

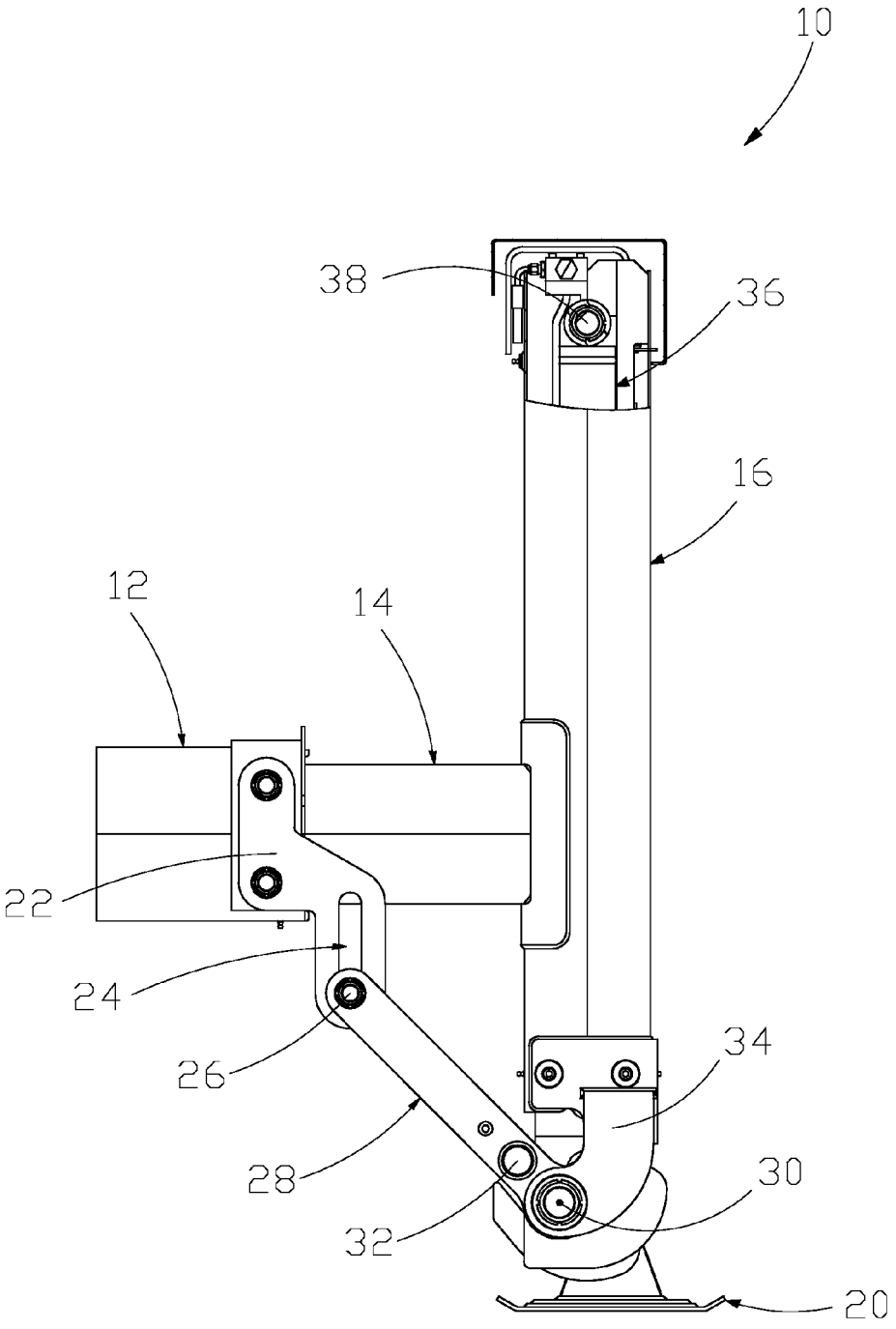

Fig. 2

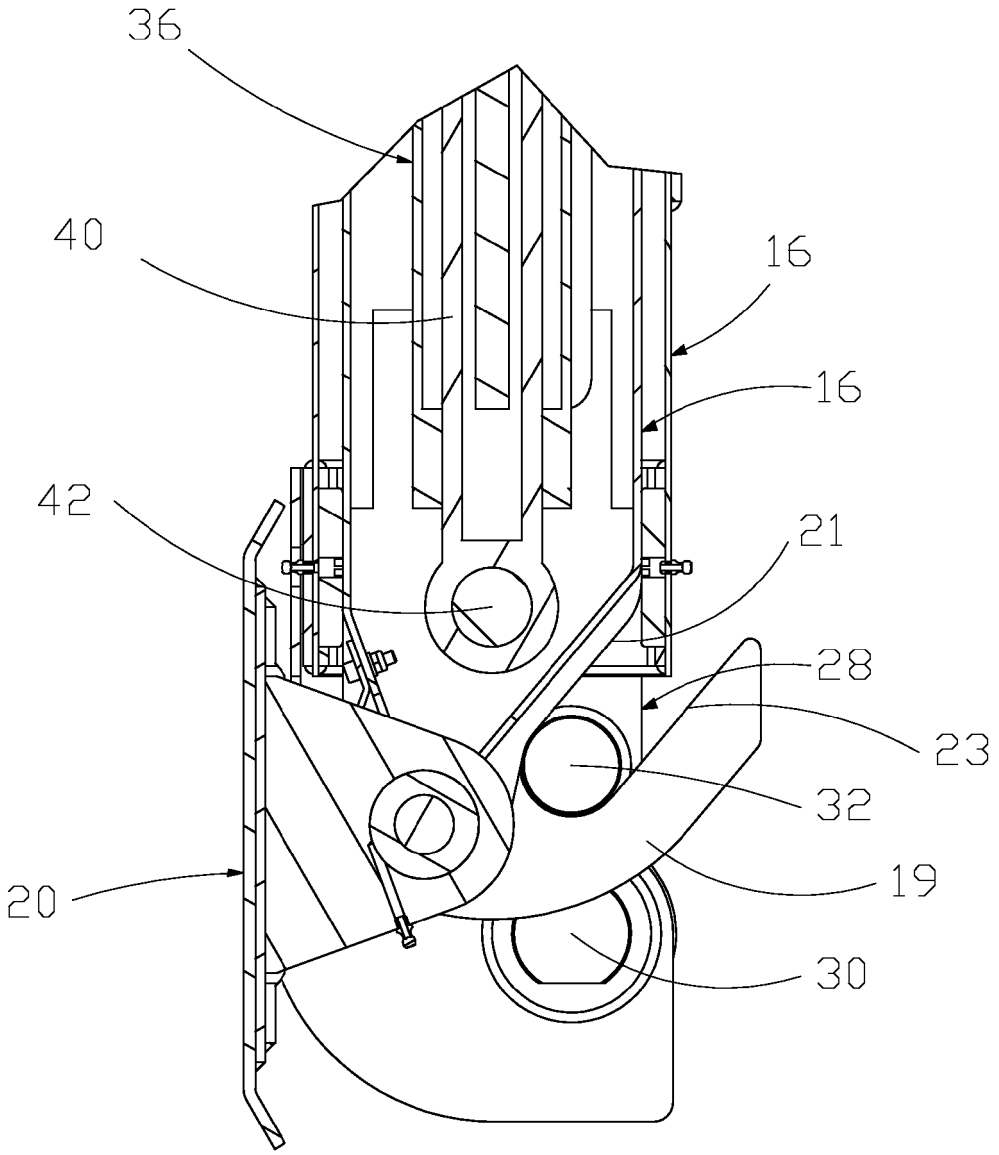

Fig. 3

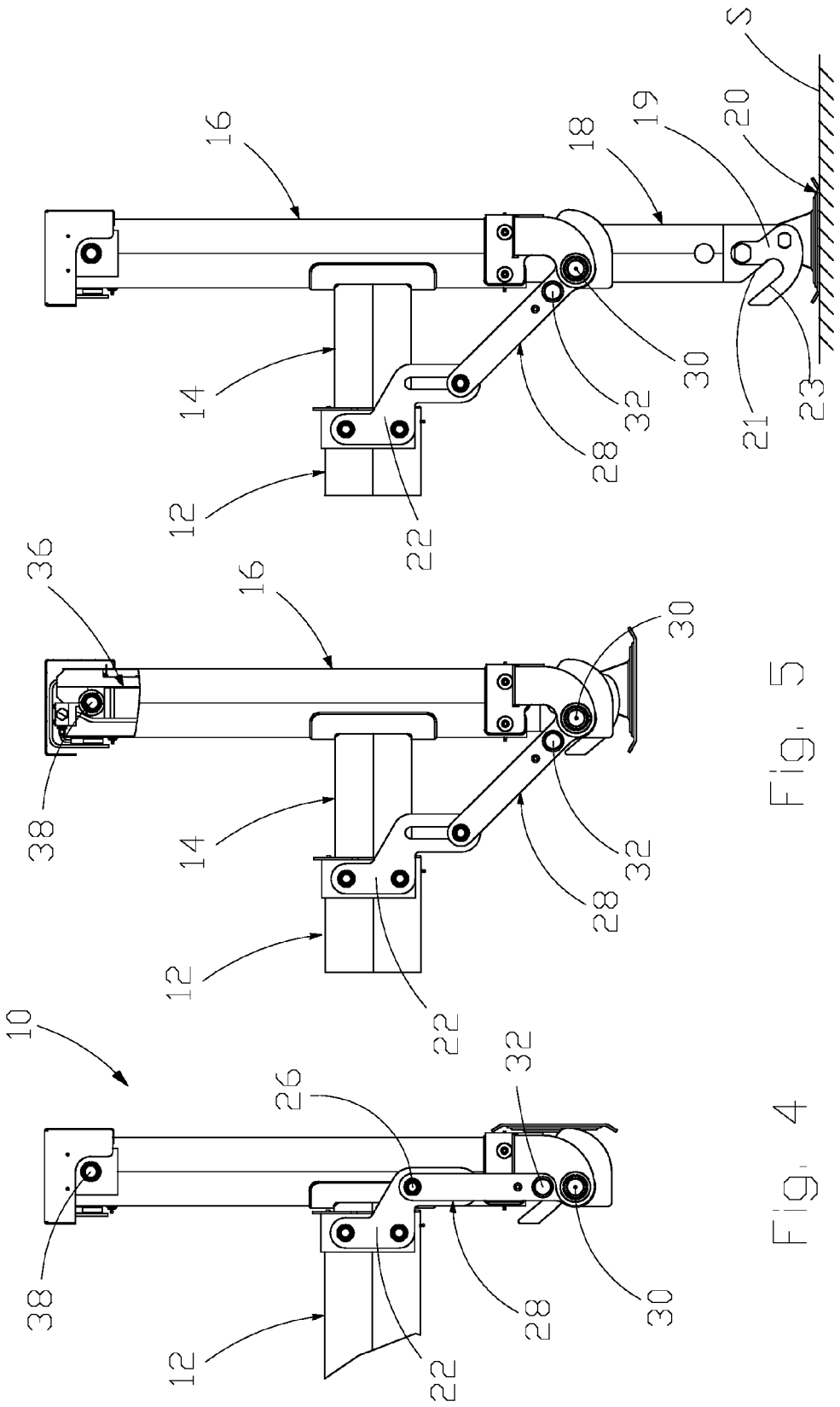

Fig. 6

Fig. 5

Fig. 4

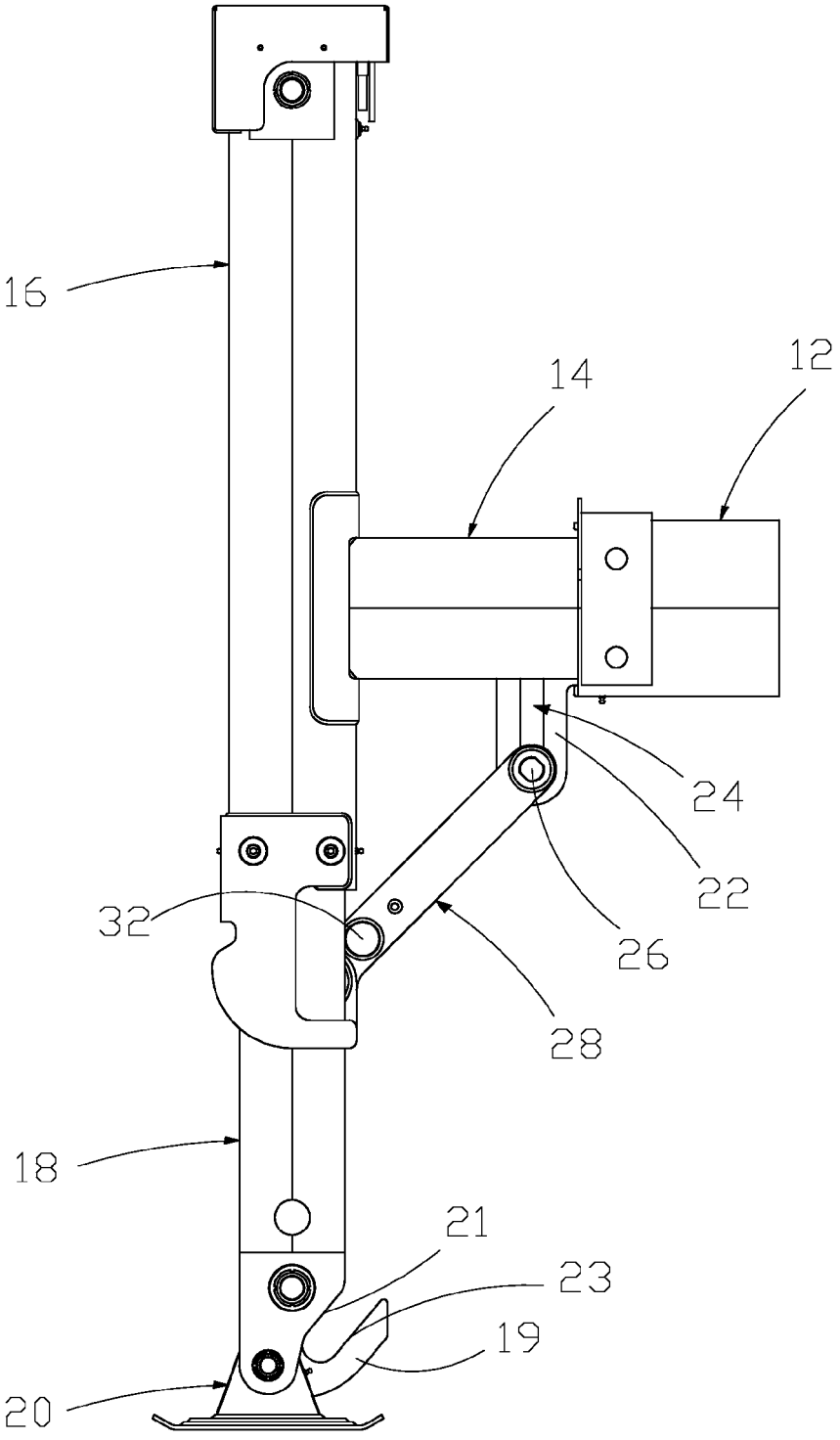

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 11 16 1980

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 790 133 A (JONES C) 5 February 1974 (1974-02-05) * abstract * * column 2, line 63 - line 68 * * column 3, line 47 - line 62 * * column 4, line 38 - line 54 * * figures *	1	INV. B66F9/075 B66C23/78
A	FR 2 644 151 A3 (NARDI DANIELE [IT]) 14 September 1990 (1990-09-14) * page 4, line 7 - page 5, line 19 * * figures 6-8 *	1	
A	JP 4 201993 A (JAPANIC CORP) 22 July 1992 (1992-07-22) * abstract * * figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B66F
B66C
E02F
B60S

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 July 2011	Cabral Matos, A

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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