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(54) **Stabiliser leg for a load carrying vehicle [1999/39]**

(57) An upturning device (3) for jack arms (1) in crane-carrying lorries comprises a torque generator (11), arranged coaxially inside a hollow pivot (10) linking the jack arm (1). The torque generator has a rotor (12) which is integral with a linking head (8) of the jack housing (5) and a stator (16) that is coaxial and internal to

the rotor and is torsionally connected to a linking plate (2) bearing the hollow pivot and is rigidly connected to one end of a supporting crossbeam (4). Preferably, the torque generator is hydraulic and comprises of a semi-rotary alternative actuator contained in the cavity of said linking pivot (10).

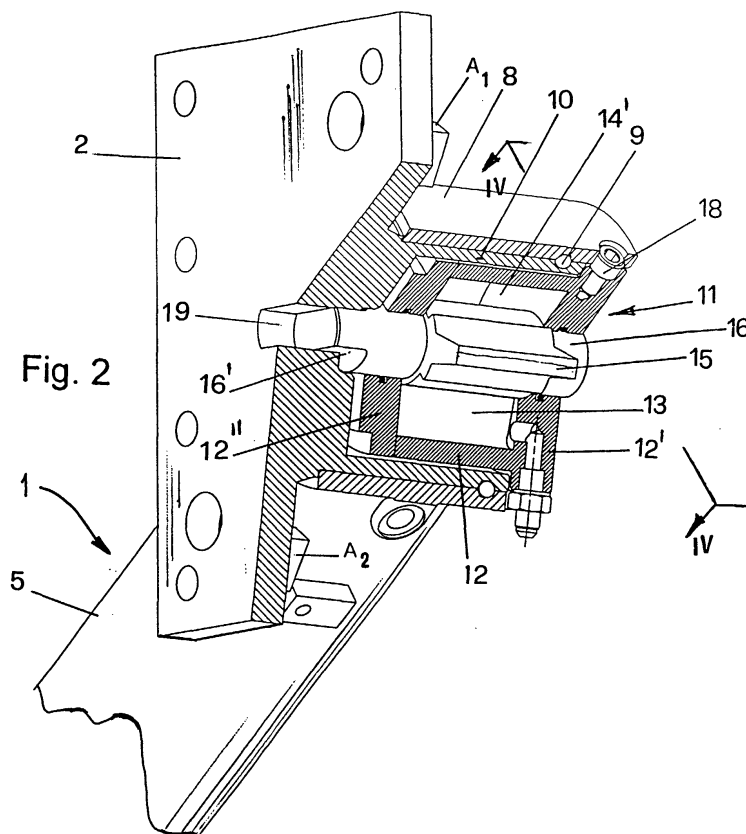


Fig. 2

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Description

[0001] The present invention is concerned with an upturning device for jack arms suited for bringing to size lorries provided with lifting cranes, as requested for running on the road.

[0002] As well known to persons skilled in the art, before lifting cranes mounted on lorries can be used a preliminary step of stabilization of the lorry is required, which consists in lifting all or part of the wheels of the lorry by means of telescopic jack arms. These are usually carried at the ends of a couple of supporting crossbeams which are rigidly connected to the frame of the lorry. The crossbeams can also be telescopically extended, in order to widen the rectangle at whose corners said jack arms are arranged.

[0003] In order to limit the size, the jack arms are supported at the respective ends of the supporting crossbeams, whereby they are pivotable in a vertical plan, so that they can be upturned from a vertical operative position to a rest position, and vice versa. The rest position is usually horizontal or vertical or sub-vertical, and in any case is upturned with respect to the operative position.

[0004] Devices are known for upturning the jack arms, where the rotational torque is generated by linkages operated by the very telescopic motion of said jack arms or by independent actuators. A device of that kind, described in US-A-5.398.969, comprises a rigid connecting rod having one end linked to the movable rod of the jack arm and the other end linked to a rigid portion of the frame. The main drawback of this known system is the considerable size of the device, because the connecting rod, that typically extends laterally to the jack arm, needs adequate room for freely moving without interfering with the frame of the lorry or with any part of it. In other known devices, the rotating torque of the jack arms is obtained by means of ropes or chains, which are engaged by pulleys or toothed sprocket wheels and are subjected to the pull of a hydraulic jack which can be the jack arm itself or a distinct, dedicated jack.

[0005] Devices of this second kind, such as described in WO96/34782 and WO94/04399, are considerably bulky and need an accurate maintenance with frequent lubricating operations, in order to avoid jamming of the device.

[0006] A main object of the present invention is to overcome said drawbacks of the known upturning devices and, more particularly, it is an important object of the invention to provide a device having a small size and at the same time being capable of generating a strong operating torque, adequate to easily effect rotation and upturning of the respective jack arm.

[0007] Another object of the invention is to provide a jack arm upturning device as specified, which has a size not substantially exceeding the maximum size of the jack arm itself during both the operative and the rest conditions.

[0008] Another important object of the invention is to

provide an upturning device that is reliable and free from maintenance, and that is particularly suitable for operating in the presence of mud, dust and atmospheric agents that could adversely affect the operation of unprotected cinematic devices.

[0009] According to the invention, the above and other objects as will appear from the following detailed description are achieved by means of a jack arm upturning device, for bringing to size lorries provided with lifting cranes, having the specific features defined in the following claims.

[0010] Substantially, this invention is based on the concept of providing a device having a torque generator which is arranged coaxially to a hollow pivot to which the respective jack arm is linked. The torque generator has a rotor integral with a linking head of the jack housing and a stator which is coaxial and internal to the rotor and is torsionally fastened to a corresponding linking plate carrying the hollow linking pivot and rigidly fastened to the corresponding end of the respective supporting crossbeam.

[0011] According to a preferred embodiment of the invention, said torque generator is hydraulic and consists of a semi-rotary alternative actuator (or lifter) contained in the cavity of the linking pivot. The actuator comprises a cylindrical jacket -with a separating partition defining opposed hydraulic chambers- which is fastened to the linking head of the jack and acts as an angular driving rotor for said head, and further comprises a stationary bladed shaft that is sealingly arranged in the jacket. The latter, due to the pressurized fluid which is selectively fed to the hydraulic chambers, correspondingly turns with respect to the shaft through an angle having a predetermined amplitude and direction. The stationary bladed shaft, acting as a reaction stator for generating the torque, is provided with a prismatic end projecting from the actuator jacket and lockingly engaging a housing and locking seat that is provided in said linking plate.

[0012] Features, purposes and advantages of the upturning device according to the invention will clearly appear from the following detailed description and with reference to the attached drawings, given by way of non limiting example, wherein:

Fig. 1 is a elevation view of a jack arm provided with an upturning device according to the invention, wherein the jack is drawn in solid lines in its operative condition and in dashed lines in its rest condition;

Fig. 2 is a perspective, broken away view of the upturning device of Fig. 1;

Fig. 3 is a perspective, exploded view of the device of Fig. 2; and

Fig. 4 is a cross section view to an enlarged scale, made along line IV-IV of Fig. 2.

[0013] With reference to the drawings, a jack arm 1 is rotationally connected, through the intermediary of a linking plate 2 provided with an upturning device 3, to one end of a supporting crossbeam 4 with respect to which jack 1 can take both an operative position (drawn in solid lines in Fig. 1) and a rest position, e. g. a sub-vertical position drawn in dashed lines in Fig. 1, which is shifted of about 180° from the operative position. The above positions are defined by stops A1-A2 of plate 2.

[0014] Jack 1 comprises a cylindrical housing 5 provided with a telescopic rod 6 connected to a double-action piston, not shown in the drawing, which is sealingly movable within housing 5 and is subjected to the action of a pressurized hydraulic fluid which is fed into and discharged from housing 5, through ducts not shown. Rod 6 of jack 1 carries a bearing foot 7 at its lower end and jack housing 5 carries an integral linking head 8 at its upper end. Linking head 8 consists of a cylindrical stub having its axis at right angles to the axis of housing 5 and rigidly connected to housing 5 or integral with it. Linking head 8 is rotationally mounted, with the intermediary of rolling balls 9 for axial restraint, on a cylindrical hollow pivot 10 carried by plate 2, and preferably integral with it.

[0015] According to the invention, a torque generator 11 is arranged in the cavity of pivot 10, which torque generator, when energized, is capable of giving rise to angular displacements of housing 5 of jack 1 with respect to linking plate 2 in any of both directions, so that the jack is brought from its rest position to its operative position and vice versa.

[0016] In general, torque generator 11 has a rotor that is integral with linking head 8 of jack housing 5, and a stator that is coaxial and internal to the rotor and is torsionally connected to linking plate 2.

[0017] According to a preferred embodiment of the invention, torque generator 11 is a hydraulic arrangement consisting of a semi-rotary alternative actuator (so called lifter) having a cylindrical jacket 12, which acts as a rotor and is provided with a bottom 12' and a separating partition 13 defining opposed hydraulic chambers 14-14' which are capable of receiving pressurized hydraulic fluid. Hydraulic chambers 14-14' extend on opposite sides of partition 13 and are defined between the partition and a blade 15 of a stationary bladed shaft 16 acting as a stator. The hydraulic fluid is supplied to chamber 14 or alternatively to chamber 14', depending on the direction of rotation selected for jacket 12, through respective ducts 17-17' selectively acting for supply and discharge.

[0018] Jacket 12 is torsionally connected to linking head 8 of jack 1 by means of bolts 18 and is therefore the driving means for head 8 and jack 1 that is integral with it. Stationary bladed shaft 16, in its turn, is provided with a prismatic end 16' projecting from a flange 12" which frontally plugs jacket 12 of the actuator, in order to engage, for purposes of torsional locking, with a corresponding housing and clamping seat 19 provided

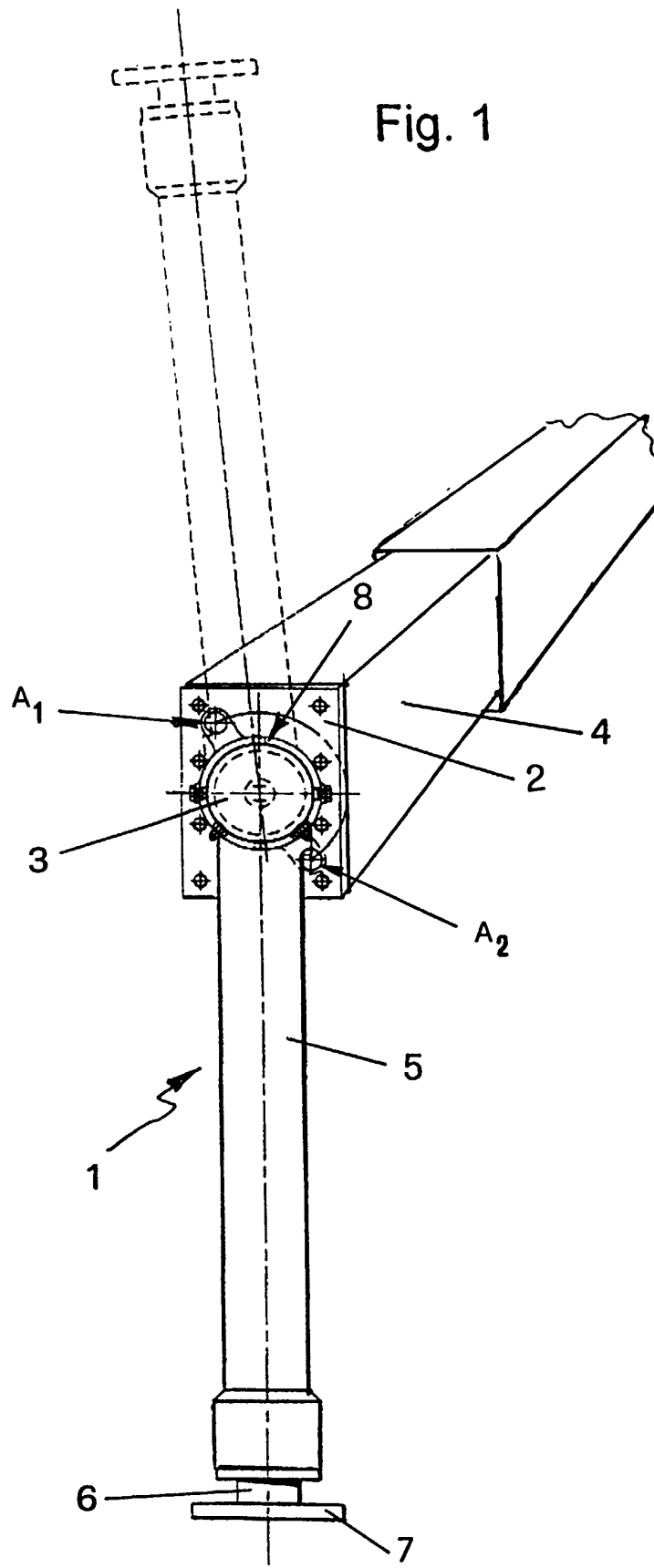
in linking plate 2.

[0019] It will be understood that the preferred embodiment as described above may be changed within the scope of the invention as defined in the attached claims.

Claims

1. An upturning device (3) of a jack arm (1) used for bringing to size lorries provided with lifting cranes, **characterized in that** it comprises a torque generator (11) arranged coaxially to a linking pivot (10) of the jack arm and having a rotor (12) that is integral with a linking head (8) of a housing (5) of the jack and a stator (16), that is coaxial and internal to the rotor and is torsionally connected to a linking plate (2) carrying said hollow linking pivot and rigidly connected to one end of a supporting crossbeam (4).
2. The upturning device (3) of claim 1, **characterized in that** said torque generator (11) is hydraulic and consists of a semi-rotary alternative actuator that is coaxial to said linking pivot (10).
3. The upturning device (3) of claim 2, **characterized in that** said linking pivot (10) is hollow and contains said semi-rotary alternative actuator (11).
4. The upturning device (3) of claim 3, **characterized in that** said semi-rotary alternative actuator (11) comprises a cylindrical jacket (12) having a separating partition (13) defining opposed hydraulic chambers (14-14') and connected to the linking head (8) of the jack and acting as an angular driving rotor for said head, and a stationary bladed shaft (16), acting as a stator for producing said reaction torque and sealingly housed in said jacket (12) and torsionally connected to said linking plate (2).
5. The upturning device (3) of any of claims 1 to 4, **characterized in that** said stationary bladed shaft (16) is provided with a prismatic end (16') projecting from a flange (12"), that frontally plugs the jacket (12) of the actuator, in order to engage, for purposes of torsional locking, with a housing and clamping seat (19) provided in said linking plate (2).
6. The upturning device (3) of any of claims 1 to 5, **characterized in that** said opposed hydraulic chambers (14-14') are alternatively suppliable for selecting the direction of rotation of the actuator (11), through respective ducts 17-17' selectively acting for supplying and discharging.

Fig. 1



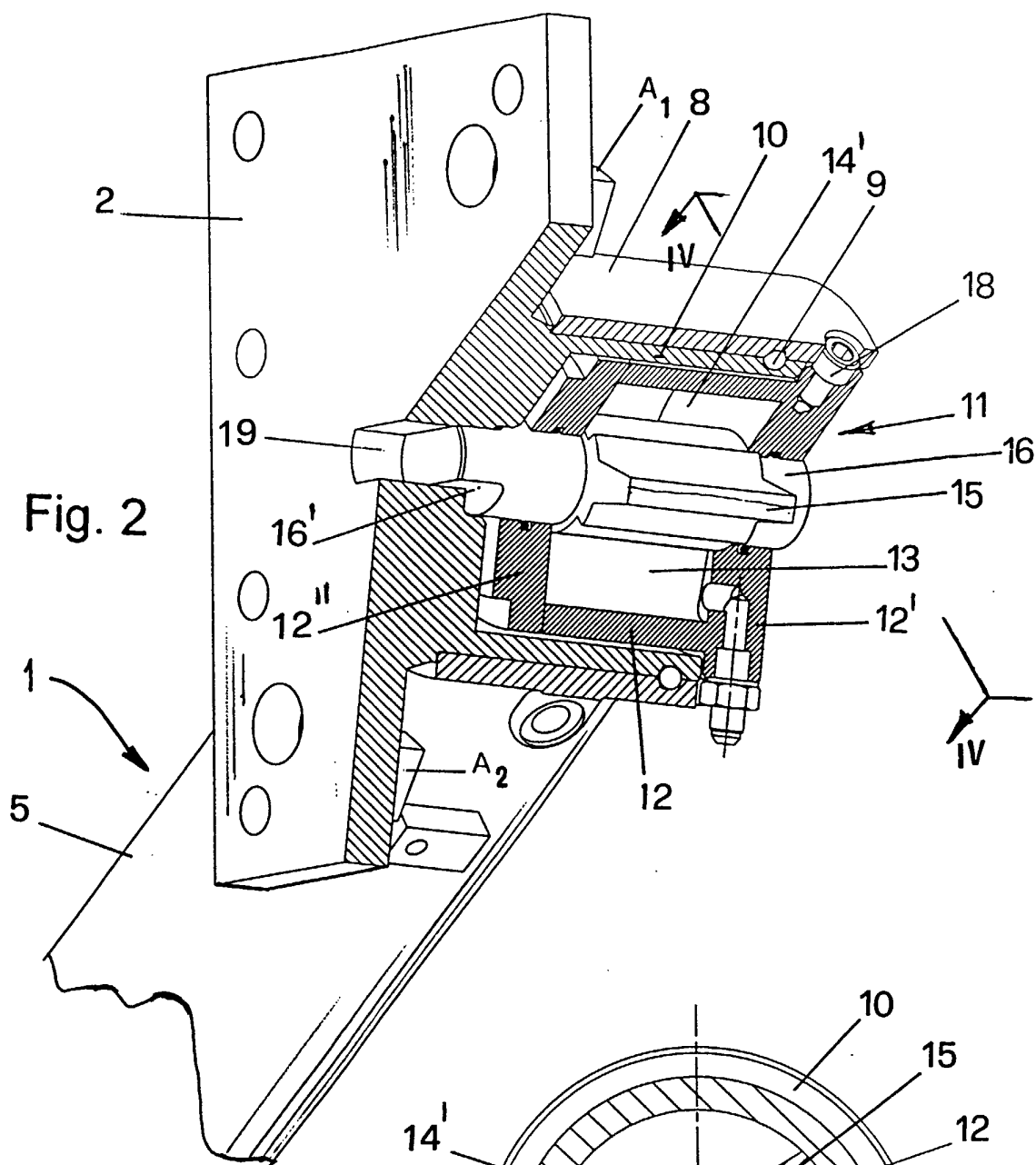


Fig. 4

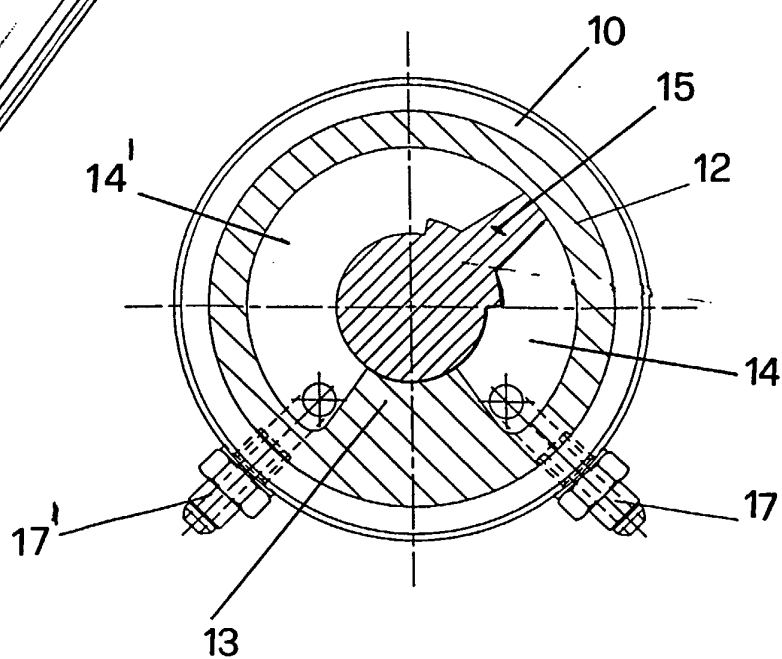


Fig. 3

