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NL-9288 CA Kootstertille(NL)(72) Inventor: **Fijnvandraat, Jan Willem****Koarte Achte 7****NL-8629 PM Scharnegoutum(NL)**Inventor: **Berends, Jan****De Zeilen 29****NL-9285 ML Buitenpost(NL)**(74) Representative: **'t Jong, Bastiaan Jacobus et al****OCTROOIBUREAU ARNOLD & SIEDSMA****Sweelinckplein 1****NL-2517 GK 's-Gravenhage(NL)**(54) **Vehicle lifting device.**

(57) The invention relates to a vehicle lifting device (1) comprising at least one hollow column (2) folded from metal plate and provided with a lengthwise channel (4), in which a carriage (3) provided with guide wheels (5,6) is vertically movable, to which carriage (3), via the channel (4), bearing arms (8) for supporting a vehicle are connected at the bottom end, and drive means for moving the carriage (3) upward in the column (2) through a lifting height in the order of magnitude 2 metres. The column (2) has a height in the order of magnitude of 3.5 metres, and the carriage (3) a height in the order of magnitude of 1.5 metres. The column (2) has a profile comprising U-shaped parts (25,26) connected on either side of the channel (4) with the open sides facing each other, wherein the guide wheels (5,6) on the carriage (3) comprise a pair of coaxial wheels (6) close to the top end and a pair of coaxial wheels (5) close to the bottom end of the carriage (3) and wherein the wheels (5,6) of each pair each run directly in one of the U-shaped profile parts (25,26).

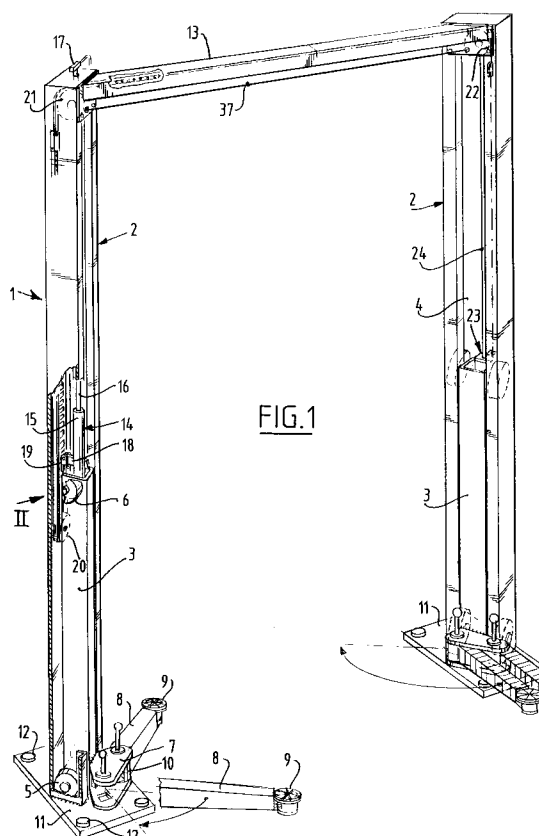


FIG.1

EP 0 473 239 A2

The invention relates to a vehicle lifting device comprising at least one hollow column folded from metal plate and provided with a lengthwise channel, in which a carriage provided with guide wheels is vertically movable, to which carriage, via the channel, bearing arms for supporting a vehicle are connected at the bottom end, and drive means for moving the carriage upward in the column through a lifting height in the order of magnitude 2 metres.

Such a one- or two-column lifting device is generally known. Compared to the also known four-column lifting devices with drive-on runways, a lifting device of the present type has the advantage of occupying less space and a better accessibility of the underside of the vehicle lifted with the lifting device. In this respect it is noted that understood by a lifting height in the order of magnitude of 2 metres is a height such that a vehicle mechanic can stand upright under the lifted vehicle. In general therefore a height of somewhat less than 2 metres can suffice.

Since stringent safety requirements must be fulfilled and the relatively great loads are taken up by only two columns, in the known lifting devices the construction of the carriages, and in particular the guide construction therefor, are complicated. Use is often made of separate rail profiles which are welded fixedly in the columns and with which accurately machined metal guide wheels on the carriage co-act. Owing to this complexity and the accuracy required, the construction of the known two-column vehicle lifting devices is expensive.

The invention now has for its object to provide a vehicle lifting device of the type described in the preamble which can be manufactured more simply and therefore more economically.

According to the invention this object is achieved in that the column has a height in the order of magnitude of 3.5 metres, and the carriage a height in the order of magnitude of 1.5 metres, in that the column has a profile comprising U-shaped parts connected on either side of the channel with the open sides facing each other, wherein the guide wheels on the carriage comprise a pair of coaxial wheels close to the top end and a pair of coaxial wheels close to the bottom end of the carriage and wherein the wheels of each pair each run directly in one of the U-shaped profile parts.

The height of the columns of the known vehicle lifting devices is limited to about 2.5 metres. Applicant has realised however that there is essentially no objection to making the columns considerably higher and that hereby the carriages can likewise be embodied considerably higher. This provides the advantage that the load of the guide wheels can be greatly limited, whereby the wheels can bear directly on the plate metal of the columns and no complicated constructions with separate rail

profiles are necessary.

It is noted in this respect that the height in the order of magnitude of 3.5 metres must be understood as approximately the height at which is located the highest point of an automobile lifted through the lifting height. With the lifting devices according to the prior art a height must in any case also be available in the workshop such as to enable normal use of the lifting device. There is therefore no objection whatever to embodying the columns of the lifting device according to the invention with the intended height. The mentioned height of the carriages corresponds of course to the height of the column minus the lifting height, and this height is thus roughly equal to the maximum height of an automobile.

Owing to the great height of the carriage achieved with the invention and therefore the great distance from the guide wheels, the reaction forces exerted by the guide wheels as a result of the load of the bearing arms are so small that the wheels can run directly on the sturdy metal plate of the columns without special provisions.

For taking up the reaction forces in the direction transversely of the wheels the step of claim 2 is preferably applied. Due to the invention these reaction forces are also so small that simple and thus inexpensive slide pieces can suffice.

A favourable embodiment is therein characterized in claim 3.

A very simple assembly is achieved when the wheels are axially slidable on the shaft stumps and the slide pieces have a collar axially enclosing the wheels. Since the slide pieces are themselves also enclosed in the columns, a simple securing or clamp fitting of the slide pieces in the shaft stumps or the wheels can be sufficient.

Partly due to the small loads, the step of claim 5 can be advantageously applied.

With regard to choice of material for the wheels and slide pieces, claims 6 and 7 are preferably applied.

The invention will be further elucidated in the following description in the light of the embodiment shown in the figures.

Fig. 1 shows a partially broken away perspective view of an embodiment of a vehicle lifting device according to the invention.

Fig. 2 shows on a larger scale a partially broken away view according to arrow II in fig. 1.

Fig. 3 shows a simplified section according to III in fig. 2.

The vehicle lifting device 1 according to the invention shown in fig. 1 comprises two hollow columns 2 of sturdy steel plate, which have a substantially C-profile as shown particularly in fig. 3. Each column 2 thus has a channel 4 on one side.

Each column 2 is fixedly welded onto a base plate 11 which is anchored in the ground using bolts 12.

Received into each hollow column 2 is a vertically movable carriage 3 which is provided at its bottom end and top end with guide wheels 5 and 6 respectively. The basic body of the carriage 3 consists of a U-profile. The construction is such that the body of the U-profile of the carriage 3 lies in the channel 4 of the column 2 such that it lies in one plane with the profile parts of the column 2 adjoining the channel 4.

On the bottom end each carriage 3 bears a support construction 7 which protrudes outside the column 2 and to which two bearing arms 8 are pivotally mounted. Integrated into the swivel bearings 10 is an arresting mechanism which can lock the relevant arm 8 in a chosen swivel position. Situated on the end of an extensible portion of each arm 8, which is not further shown in fig. 1, is a carrier 9, the top surface of which can grip a support on the bottom of a vehicle for lifting up. To lift a vehicle the arms 8 are swivelled into such a position and extended so far until all four carriers 9 of the lifting device 1 are situated under a relevant support of the vehicle so that the vehicle can be lifted by the simultaneous movement of the two carriages 3 in both columns 2.

For synchronous upward movement of the carriages 3 the lifting device 1 is provided with drive means. In the embodiment shown these drive means comprise a hydraulic jack 14 mounted in the left-hand column 2 in fig. 1. The cylinder 15 of this jack 14 is fixedly connected to the carriage 3 and the piston rod 16 is fixedly connected at its top end to the column 2. The piston rod 16 has a central bore 36 to the outer end of which is connected a hydraulic oil feed 17. For lifting, hydraulic oil under pressure is pressed via the feed 17 and the bore 36 above the piston into the cylinder 14 whereby the cylinder 14 and therefore the carriage 3 are moved upward.

For synchronous driving of the carriage 3 in the right-hand column 2 in fig. 1 a chain transmission is arranged. This chain transmission comprises a chain 19 which is fixedly mounted on a support 18 forming an entity with the carriage 3. The chain 19 extends downward from this support 18 and runs around a chain wheel 20 that is rotatable about a shaft connected to the column 2.

From the chain wheel 20 the chain extends upward via a chain wheel 21 at the top of the left-hand column 2 through a cross beam 13 mutually joining both columns 2 at their top ends, over a chain wheel 22 at the top of the right-hand column 2 to the right-hand carriage 3. The end of the chain 19 is fixedly connected to the carriage 3 by means of a safety construction 23 not further shown in fig.

2. This safety construction 23 is embodied such that if the chain 19 should break the rod 24 mounted fixedly in the column 2 is gripped immediately, thus preventing the right-hand carriage 3 from falling downward.

Integrated into the left-hand column is a safety device which, during normal use, also prevents undesired downward movement of the carriages 3, for example as a result of a leakage in the hydraulic jack 14. This safety device comprises a hole strip 27 mounted fixedly in the left-hand column with which a ratchet 28 co-acts that is connected pivotally to the left-hand carriage 3 by means of a shaft 29. The ratchet 28 is embodied such that it allows an upward movement but in the case of downward movement grips into a hole in the hole strip 27. To be disengaged from the hole strip 27 the ratchet 28 can be rotated round the shaft 29 in counter-clockwise direction as seen in fig. 2 by an electromagnet 30. This electromagnet 30 is activated when the control device, which is not described further here, receives a command to lower the lifting device.

The described chain transmission ensures that both carriages 3 run synchronously unless, as described, the chain breaks. The right-hand carriage 3 is then instantaneously locked on the rod 24. Chain breakage is moreover detected by a switch means, not further described here, and this switch means generates a signal to the control device whereby the lifting or lowering movement is immediately ended. Thus is prevented that a car resting on the bearing arms comes to hang at an unacceptable slant and possibly falls from the arms.

The mentioned switch means likewise detects when the chain 19 becomes slack. This can occur when during lowering the right-hand carriage is obstructed by a support or the like accidentally left behind under the device. The lowering movement will in this case also be switched off immediately. These safety devices are otherwise generally per se known. Another per se known safety device is a sensor wire 37 arranged directly beneath the cross beam 13 which activates a switch as soon as the wire 37 is pressed upward, for example by the roof of a vehicle. To prevent damage through contact with the cross beam 13 the lifting movement is then immediately switched off.

As will be apparent from fig. 1, the columns 2 of the lifting device 1 according to the invention have a height such that an automobile can be lifted to a height such that for example a vehicle mechanic can stand upright under the lifted vehicle. This lifting height lies in the order of magnitude of 2 metres. The column height 2 is equal to the sum of this lifting height and the maximum height of a vehicle for lifting with the lifting device. In other words, each column has a height in the order of

magnitude of 3.5 metres. As noted earlier, the carriages 3 can hereby have a height in the order of magnitude of 1.5 metres whereby the reaction forces of the wheels 5, 6 in the columns 2 remain very limited as a result of the load on the bearing arms 8.

As is shown particularly clearly in fig. 3, the wheels can hereby run directly on the plate material of the column profiles. As is also particularly clear from fig. 3, the profile of the column 2 in the embodiment shown has U-shaped parts 25, 26 connected on either side of the channel 4 with the open sides facing each other. These U-shaped parts 25, 26 form the wall parts in which the wheels can run.

In the embodiment shown here the wheels 6 are solid wheels of a polyamide type which has good running qualities. The solid wheels 6 are mounted on shaft stumps 32 welded fixedly to the U-profiles of the carriages 3. The wheels 6 are pushed onto the shaft stumps 32 and are each secured by a collar 34 of a slide piece 33 placed with a light grip fitting into a cylindrical recess in the head end of the shaft stumps 32. The slide pieces lie against the connecting wall of each of the U-shaped profile parts 25, 26, or against the oppositely lying wall parts of the column 2. The slide pieces 33 take up the reaction forces in the axial direction of the wheels 5, 6 and thus simultaneously secure the wheels 5, 6 on the relevant shaft stumps. The slide pieces 33 are preferably manufactured from a suitable wear-resistant plastic such as HD-polythene.

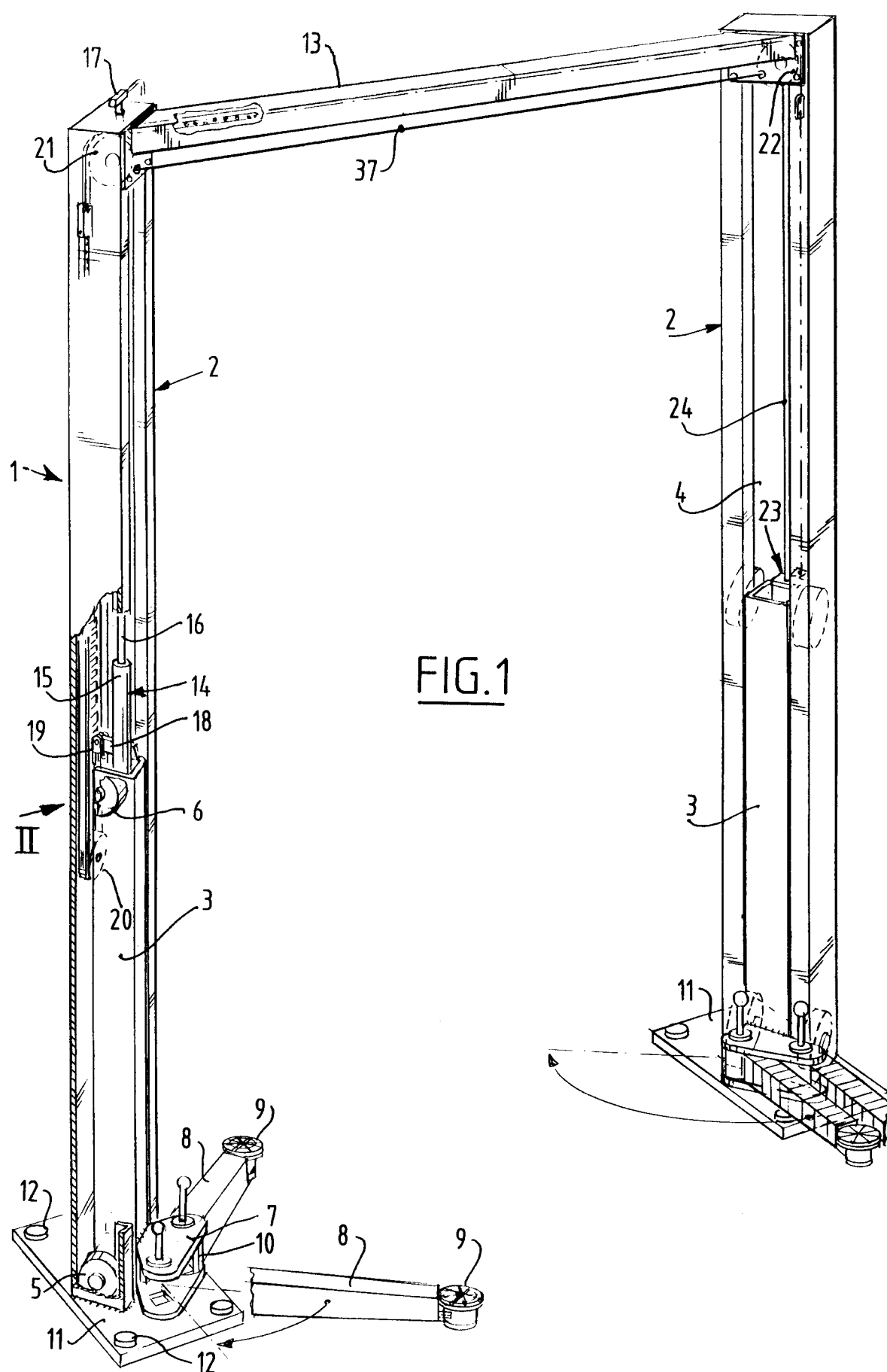
The invention is not limited to the embodiment shown in the figures. In particular, another shape can for instance be chosen for the profile of the columns 2 and the construction of the carriage 3 and the running wheels and slide pieces can be embodied differently. For example a wheel can be made as one entity with a slide piece from a suitable material such as an oil-filled nylon. The drive means for the carriages also have many variation possibilities. Since the columns have a height such that they reach as far as the height of the top of a raised vehicle, it is favourable to employ a cross beam 13 in the manner shown through which for example a chain of the drive means can run. It is also possible however to accommodate a desired connection for the drive means in a threshold.

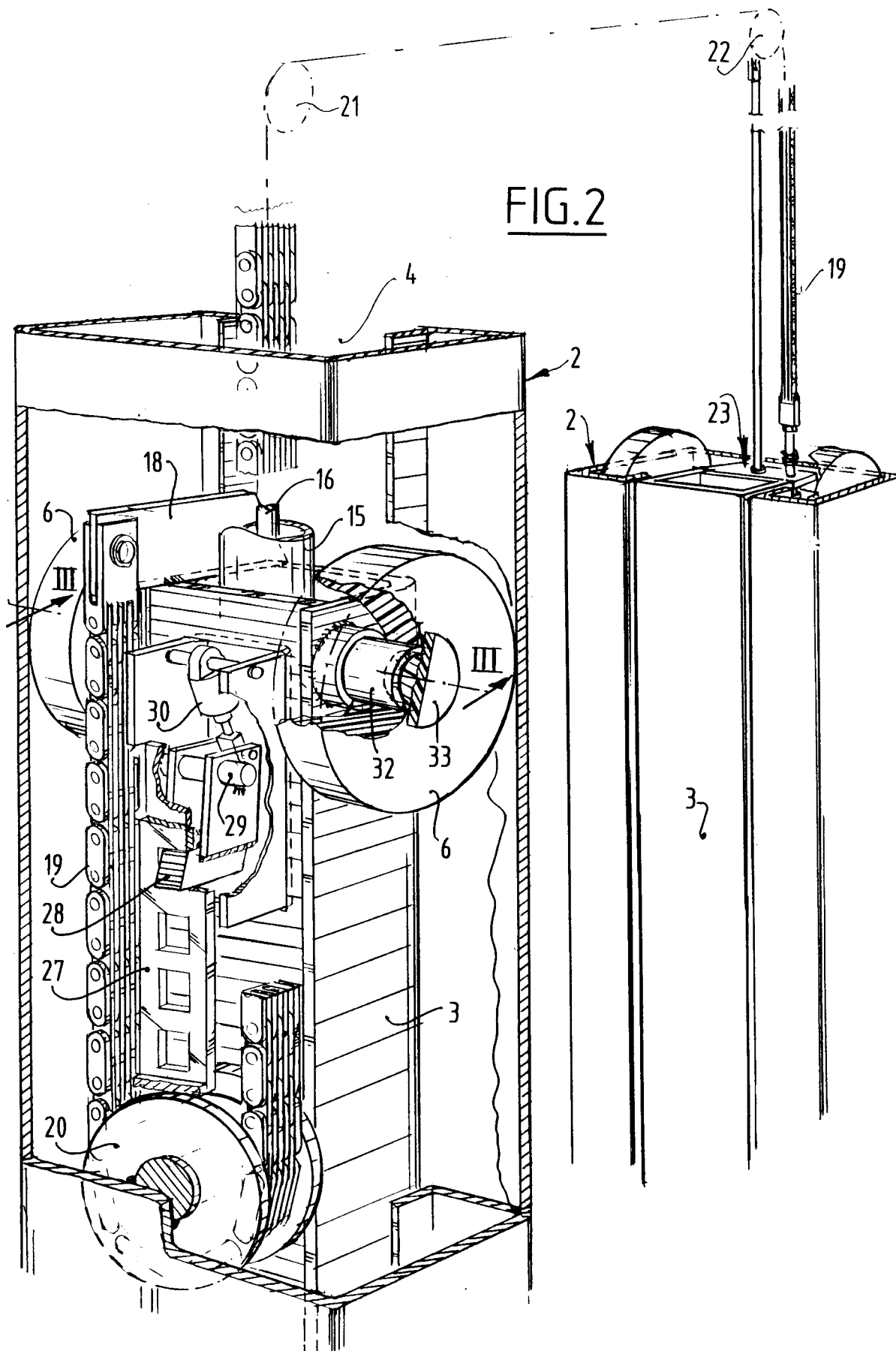
Claims

1. Vehicle lifting device comprising at least one hollow column folded from metal plate and provided with a lengthwise channel, in which a carriage provided with guide wheels is vertically movable, to which carriage, via the chan-

nel, bearing arms for supporting a vehicle are connected at the bottom end, and drive means for moving the carriage upward in the column through a lifting height in the order of magnitude 2 metres, **characterized in that** the column has a height in the order of magnitude of 3.5 metres, and the carriage a height in the order of magnitude of 1.5 metres, that the column has a profile comprising U-shaped parts connected on either side of the channel with the open sides facing each other, wherein the guide wheels on the carriage comprise a pair of coaxial wheels close to the top end and a pair of coaxial wheels close to the bottom end of the carriage and wherein the wheels of each pair each run directly in one of the U-shaped profile parts.

2. Lifting device as claimed in claim 1, **characterized in that** slide pieces are arranged protruding outside the wheels in axial direction and co-acting with the connecting wall of each of the U-shaped profile parts.
3. Lifting device as claimed in claim 2, **characterized in that** the wheels are rotatably mounted onto shaft stumps fixedly connected to the carriage and that the slide pieces are arranged on the head end of the shaft stumps.
4. Lifting device as claimed in claim 3, **characterized in that** the wheels are axially slidable on the shaft stumps and that the slide pieces have a collar axially securing the wheels.
5. Lifting device as claimed in any of the foregoing claims, **characterized in that** the wheels are solid plastic wheels.
6. Lifting device as claimed in claim 5, **characterized in that** the material of the wheels is or contains a polyamide.
7. Lifting device as claimed in any of the claims 2-4, **characterized in that** the slide pieces are of HD-polythene.





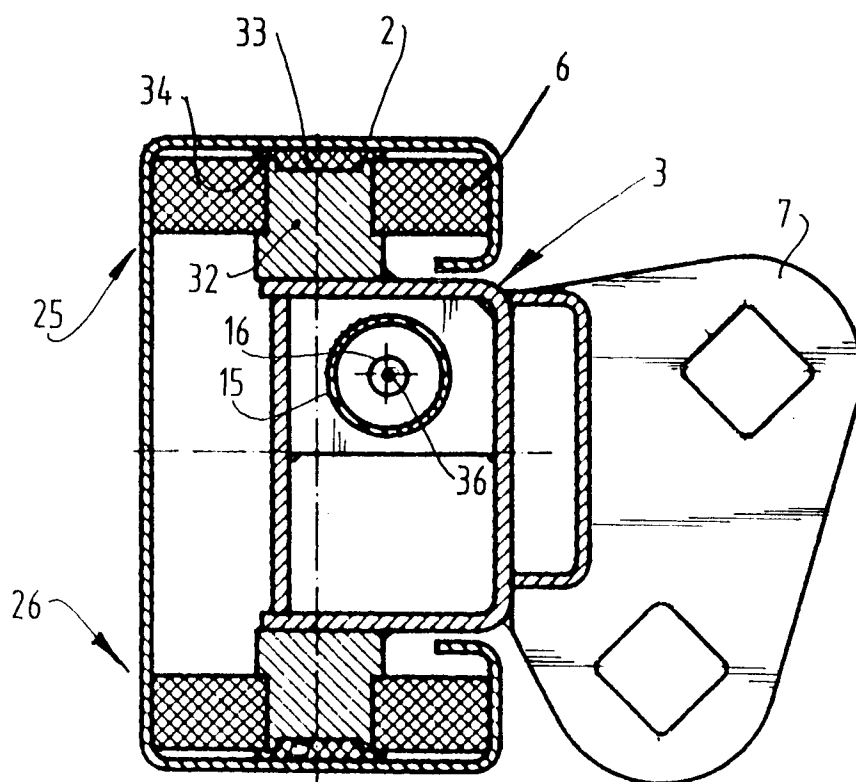


FIG.3