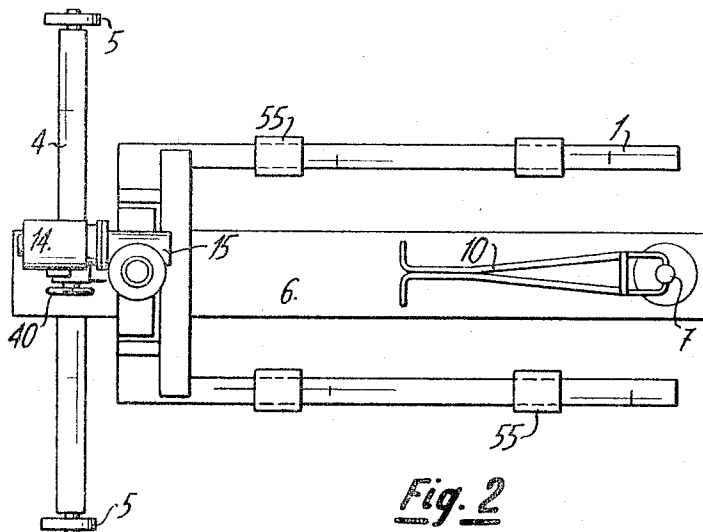
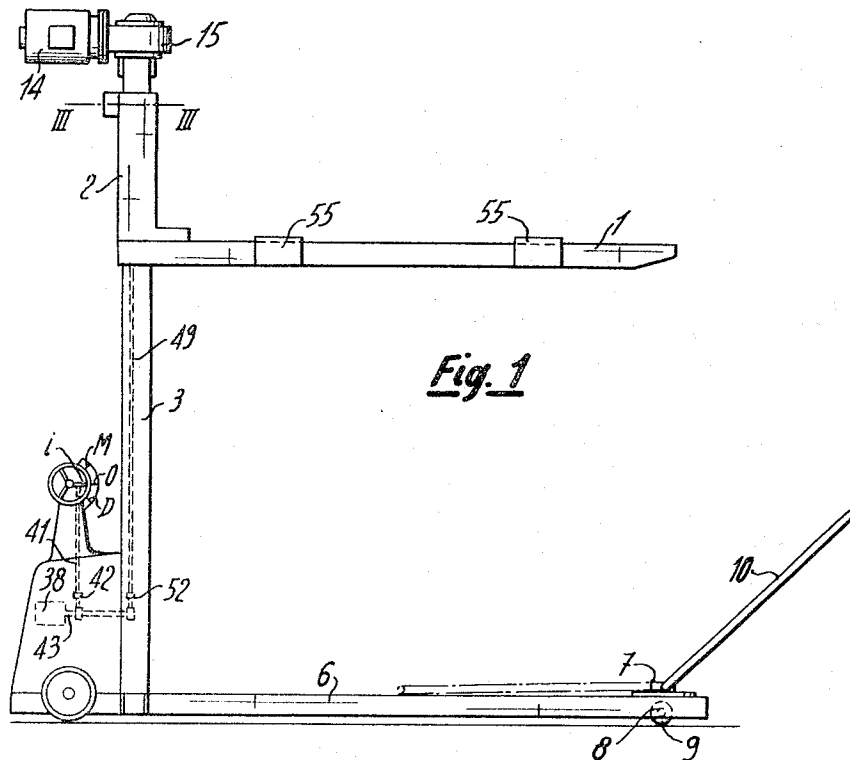


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## LIFT FOR MOTOR VEHICLES

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

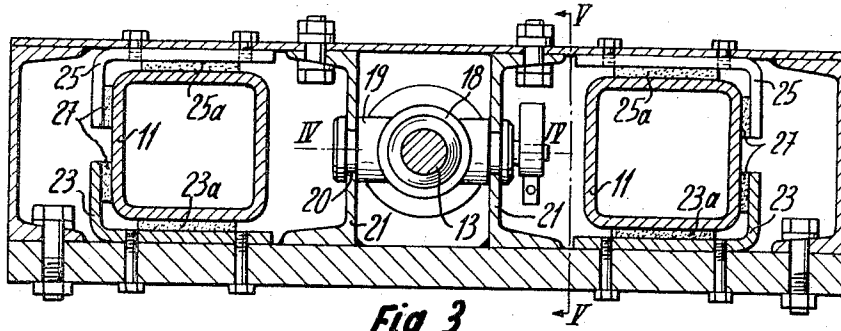


Fig. 3

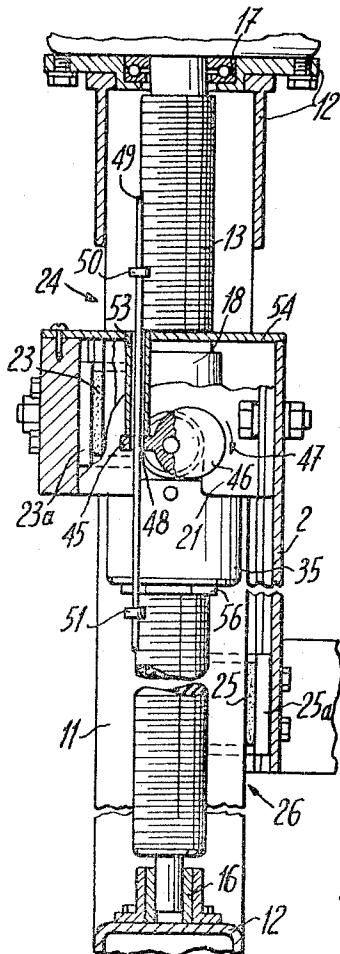


Fig. 5

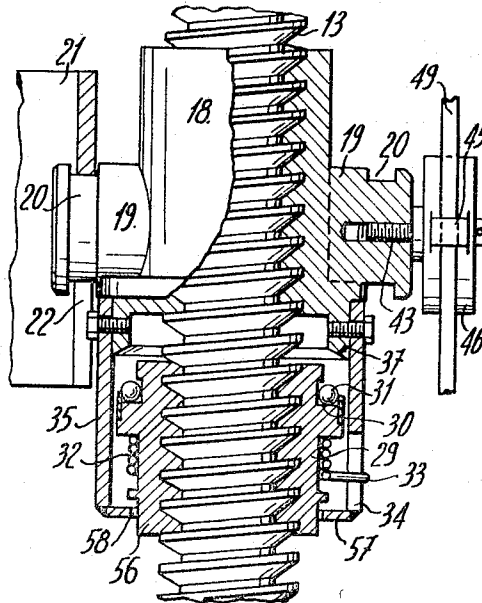


Fig. 4

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## LIFT FOR MOTOR VEHICLES

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At the present time there exist numerous types of lifts for motor vehicles. Certain of them comprise a movable assembly guided along laterally offset columns, the vertical movements of which are controlled by a lifting device housed in these columns. Finally, certain known lifts comprise a movable assembly guided along a single laterally offset column which protects the lifting device. To this end, the movable assembly engages the column through the agency of rollers or other rolling members running along this motive column.

Generally, this kind of lift must be provided with special safety devices in order to avoid a free fall of the movable assembly in the case of damage to the lifting members or further so that, when an object or a person is, inadvertently, under the raised car in such circumstances the object or person will not be crushed.

These holding or safety devices are generally delicate and costly, and require a periodical adjustment for satisfactory operation as well as faithful maintenance. In car repair shops, it is often difficult to ensure the maintenance required to avoid an accident which may be serious.

The present invention has for its object a lift for motor vehicles comprising lifting members carried by at least one slide guided along at least one laterally offset column and moved vertically by a controlled lifting device. This lift differs from known lifts in that the slide or slides are each provided with guide-blocks sliding along the columns, the relative positions of said guide-blocks, their dimensions and their friction coefficient on the faces of the columns being determined so that in the rest position of the movable assembly or during the descending movement of the latter, only a small part of the weight of the movable assembly and of its possible load is supported by the lifting device, so that in the case of damage to the lifting device, the speed of the fall of the movable assembly is strongly braked and the irreversibility of transmission ensured.

The accompanying drawing shows diagrammatically and by way of example one embodiment of the lift object of the invention.

FIG. 1 is a profile view thereof.

FIG. 2 is a plan view thereof.

FIG. 3 is a sectional view on a large scale of the slide and of the motive column along line III—III of FIG. 1.

FIG. 4 is a partial sectional view and on a larger scale of the lifting device along line IV—IV of FIG. 3.

FIG. 5 is a sectional view and on a large scale along line V—V of FIG. 3.

According to the accompanying drawing, the lifting device shown comprises a movable assembly constituted by two lifting arms 1 on which bears the car to be lifted with the interposition of blocks 55 of soft material, for example rubber. These arms are rigidly connected at one of their ends to a slide 2 which slides along a laterally offset motive column 3. This column is carried by a carriage formed by a beam 6 parallel to the arms 1 and provided at its front end with a pivot 7 carrying a spindle 8 having at each of its ends a roller 9 (one only of which is visible in the figure). A small beam 4, perpendicular to the arms 1 and provided at each of its ends with a roller 5, is fixed at its center on the beam 6, behind the column 3. A steering pole 10, hinged at the upper end of the pivot 7, allows for easily moving and guiding the

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lift. The arms 1 are each constituted by a shaped piece, the section of which is of general rectangular shape, but could have any other desired shape such as circular, solid or hollow, a plain or double T, and the like.

The motive column 3 includes two vertical bars 11, each being of generally rectangular cross-section and firmly interconnected at their lower and upper ends by plates 12. These bars could also have a square, hollow or solid, double U or double T cross section.

A screw 13 suspended at the upper end of the column 3 through the agency of an axial bearing 17 is driven to rotate by an electric motor 14 and a speed reducer 15. The lower end of this screw 13 is guided by a bearing 16 fixed to the column.

A bearing nut 18 is engaged on the screw 13 and has two opposed trunnions 19, each provided with a groove 20. The slide 2 includes two braces 21 each provided with an aperture or slot 22 opening downwardly. These apertures are engaged in the grooves 20, so that the whole of the movable outfit rests on the bearing nut 18 through the agency of the braces 21.

The movable assembly is guided in its vertical movements along the column 3, on the one hand by upper guide-blocks 23a carried by supports 23 fixed to the upper part of the slide 2 and bearing on the rear faces 24 of the bars 11 and on the other hand by lower guide-blocks 25a carried by supports 25 fixed to the lower part of the slide 2 and bearing on the front faces 26 of the bars 11. These guide-blocks are of a material having a high friction coefficient relative to the metal of the bars 11. In the embodiment shown these guide-blocks are constituted by linings 23a, 25a which may be in nylon, natural or synthetic fibres or again be constituted by brake linings. Satisfactory results have been obtained by impregnating brake linings with a greasy material such as tallow. It is known that brake linings do not require any maintenance.

The supports 25 and 23 are further provided with auxiliary guide-blocks 27 adapted to bear on the outer side faces 28 of the bars 11. These guide-blocks prevent any tendency to rock when one of the two arms 1 is more loaded than the other.

The operation of the lift described is the following:

To raise the movable outfit the operator actuates an operating member constituted in the example shown by a wheel 40 to bring its index *i* opposite a mark M (lifting). The shaft of this wheel is connected by a rod 41 to a rocker-arm 42 integral with the shaft 43 of a reversing switch housed in a control box 38. This reversing switch being mounted in the feed circuit of the motor 14, the latter is then energized and drives, in the suitable direction, the screw 13, which causes the raising of the bearing nut 18 and thus of the movable outfit which is guided by the guide-blocks 23, 25 and 27 sliding along the column 3.

The return of the wheel 40 to the position O, provokes the stopping of the movable outfit.

In order to lower the movable outfit, the operator turns the wheel 40 in the direction opposite to the preceding one until its index *i* is in the "lowering" position D, which causes the motor 14 to rotate in the opposite direction. The bearing nut 18 then descends along the screw 13 and the movable assembly is lowered. The position of the guide-blocks 23a and 25a, as well as their friction coefficient on the faces of the column 3 are chosen so that during descent only a predetermined fraction of the weight of the movable assembly weighs on the bearing nut 18 but that this fraction is sufficient for the movable outfit to follow faithfully the downward movement of the nut 18.

The return of the wheel 40 to its rest position O again causes the stopping of the motor 14 and thus the immobilization of the movable assembly.

It is obvious that the operating wheel 40, may, in accordance with a variant, be replaced by a handle or that the reversing switch may be replaced by electromagnetic contactors controlled by push-buttons, as in common practice.

If, during its lowering, the movable assembly or the load carried by the same abuts against any object, the slide is stopped whereas the bearing nut 18 continues its downward movement but only a small portion of the weight to be raised is supported by the obstacle. This arrangement thus permits of realizing, in an extremely simple and strong manner, an automatic safety device forbidding any serious accident. As a matter of fact, tests made have proved that whatever the load carried by the movable assembly, alone a percentage of 8% to 15%, according to the dimensions of the guide-blocks, of the weight of the movable assembly and of the load carried thereby bears on said obstacle.

In the embodiment shown, the lifting device is further provided with a safety nut 29, the upper part of which has a cup 30 containing a ball-race 31 which may roll freely. A hexagonal nut 56 cut in the lower part of the nut 29 engages in a corresponding opening presented by the lower part 57 of a skirt 35 fixed to the nut 18. This prevents the safety nut 29 from being driven to rotate by the screw 13 and to remain at a constant distance from the nut 18.

If, as a result of excessive wear, the thread of the bearing nut 18 disappears, the latter approaches and joins the safety nut 29, the hexagonal nut 56 frees itself from the opening 58, which permits it to turn freely with the lifting screw 13, the rolling friction of the balls 31 being distinctly less than that of the nut 29 relative to the screw.

A spring 32 is wound on the body of the safety nut 29 and lightly grips it. Its end 33 is engaged in a slot 34 made in the skirt 35 of the nut 18. The direction of winding of this spring is such that if the screw 13 rotates in the direction corresponding to the descent, the spring tightens around the nut 29 and opposes the rotation of this nut, whereas when the screw 13 turns in the opposite direction, this spring 32 loosens and permits the free rotation of the safety nut.

One of the trunnions 19 is provided with a lug 43 around which freely pivots a lever 45, the counterweight 46 of which tends to rock it in the direction of the arrow 47. The lever 45 is formed with a hole 48 traversed by a rod 49 provided with two stop rings 50 and 51 serving as a safety stop for each end of travel. The lower end of the rod 49 is hinged at 52 on the rocker-arm 42. The lever 45 normally bears on a tube 53 attached to a plate 54, the ends of which are firmly screwed to the body of the slide 2. The hole 48 has a diameter which is sufficient to allow free passage of the rod 49 but without excessive play.

When, having operated the wheel 40 to the position M, the operator lifts the movable assembly carried by the screw 18 and the plate 54 reaches the stop ring 50, the rod 49 is driven upwards, which causes the pivoting of the rocker-arm 42 as well as the wheel 40 connected by the rod 41 and brings them to the rest position. The motor stops and all is immobilized; an examination of the figure shows that in this position the movement of the wheel 40, the rod 41, the rocker-arm 42 and the rod 49 may be carried out freely in the opposite direction permitting the lowering of the movable assembly.

When the operator causes the movable assembly to descend, as soon as the stop ring 51 touches the lever 45, this latter, which bears on the end of the tube 53 pushes the rod 49 downwards, and brings the rocker-arm 42 and the wheel 40 as well as the reversing switch to the rest position.

If, as a result of excessive wear or of a mechanical accident, the thread of the bearing nut 18 disappears, the movable assembly no longer being supported by said nut starts a descending movement. The safety nut 29 which, up until now did not support any load, approaches the

body of the bearing nut 18 until the balls 31 enter into contact with a conical surface 37 and the load of the movable assembly is transmitted to the safety nut 29. In this position the lower terminal hexagonal portion 56 of this nut 29 is already disengaged from the opening 58. The spring 32 prevents the nut 29 from rotating when the screw 13 turns in the direction corresponding to the descent and the nut 29 then fulfils the role of a replacement nut and thus permits descent of the movable assembly to its low position. Whereas when the screw 13 turns in the direction corresponding to lifting, the spring 32 loosens and does not prevent the safety nut 29 from turning and since the friction of the balls 31 gripped between the cup 30 and a conical admission 37 of the nut 18 is less than the friction of this nut 29 on the threads of the screw 13, the nut 29 is driven to turn with the screw 13 and then behaves as a rotating stop incapable of lifting the movable assembly. This feature is very desirable because the raised car can be easily unloaded, since the movable assembly may redescend to the ground but never rise.

As a matter of fact, the spring 32 with its tongue 33 engaged in the slot of the skirt 35 constitutes a control device sensitive to the direction of rotation of the screw 13 and which brings about, in the case of excessive wear of the thread of the bearing nut 18, either the establishment of a mechanical transmission chain between the screw 13 and the movable assembly, or the interruption of this transmission chain.

When an object of any kind prevents the movable assembly from continuing to descend, the screw 13 continues to turn, the bearing nut 18 continues to descend and the trunnions 19 separate themselves from the braces 21. In this case the distance between the pivoting spindle 43 and the plate 54 increases. The lever 45 which normally bears on the tube 53 inclines more and more under the action of the counterweight 46. As soon as this inclination is sufficient, the edges of the hole 48 grip the rod 49 which from then on is driven downwardly and brings about the stopping of the motor 14 in the same way as when the stop 51 encounters the lever 45.

From what precedes and from the examination of the accompanying drawing, one may readily understand that the movable assembly is braked by its guide-blocks with a high friction coefficient and can in no case fall freely, which provides the lift of this invention with complete security against the risks which may result from damage to the lifting device.

It is to be noted that it is important for the unit formed by the motor 14, the reducing gear 15, the screw 13, the bearing nut 18 and the guide-blocks 23, 25 and 27 to be sufficiently irreversible to forbid any untimely descent of the movable assembly and of its load. The high friction coefficient of the guide-blocks which produces a satisfactory braking thus ensures absolute irreversibility.

The tests carried out have further confirmed that the speed of descent of the movable assembly left to itself does not appreciably change whatever the load carried by the arms 1. This characteristic permits choosing the guide-block—materials, relative positions and dimensions—so that the speed of fall is slightly higher than the speed of descent of the bearing nut 18 along the screw 13 driven by the motor 14 in order to ensure a permanent contact between the braces 21 of the slide and the trunnions 19 of the bearing nut. Further, the practical tests carried out have proved that the friction coefficient is practically not modified by the washing waters, etc. so that the operation of this anti-fall safety device is independent of the more or less satisfactory maintenance of the lift. This characteristic is probably the most important of the device described.

One embodiment of the lifting device for touring-cars has been herein described by way of example with reference to the accompanying drawing but it is obvious that

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many variants may be foreseen without departing from the scope of the invention. Thus for example, the mechanical lifting device described could also comprise a traction cable or chain or be constituted by a hydraulic device comprising a cylinder and a simple or multiple piston the relative movements of which cause the movements of the movable assembly. In the case of the rupture of a feed conduit for example in this hydraulic device, the sharp pressure drop does not risk being the cause of a free fall of the movable assembly, the latter being braked by the guide-blocks. Similarly, the arms 1, rigidly connected to the slide and adapted to support the car to be lifted, may be replaced by any other known lifting member such for example as a single arm, carrying at its free end a supporting member provided with direction adjustable spokes and carrying at their end a pad of soft material, the position of which is adjustable according to the supporting points of the car to be lifted.

According to another variant, the movable assembly could be guided along two lateral columns each protecting a part of the lifting device connected on the one hand to the movable assembly and on the other hand to a motor or other actuating device. In such a case the movable assembly would be carried by two slides each guided along one of the lateral columns and each slide would be provided with the anti-fall safety device described constituted by the guide-blocks 23, 25 bearing on the front and rear faces of these columns.

Finally, it is obvious that all the devices and members described could be replaced by their equivalents without departing from the scope of protection claimed.

I claim:

1. A lift comprising: at least one column, a slide member movable vertically on said column, a lifting arm assembly cantilevered from said slide member, means for elevating said slide member on said column, and vertically spaced upper and lower guide blocks mounted on said slide member, said lower blocks being positioned to engage said column on the side thereof adjacent to said lifting arm assembly whereas said upper block is positioned to engage the opposite side of the column so that the guide blocks develop a couple reaction on a transverse axis through the column, said guide blocks being formed of a material having a coefficient of friction which under the forces of the couple reaction effects a slow descent of said assembly and the load thereon in the event said elevating means fails to carry the weight of said assembly and load.

2. The apparatus recited in claim 1, including a movable carriage for supporting said column.

3. The apparatus recited in claim 1 in which said elevating means includes a rotatably driven screw suspended from the top of the column, and a bearing nut

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engaged on said screw for engaging said slide member.

4. The apparatus recited in claim 3 in which said slide member includes means defining downwardly opening slots for releasably connecting said slide member to trunnions extending from said bearing nut.

5. The apparatus recited in claim 3 including an automatic stopping device for interrupting rotation of said screw due to wear of said bearing nut.

6. The apparatus recited in claim 3 in which said elevating means includes a safety nut and means sensitive to the rotational direction of the screw to effect relative rotation between said screw and said safety nut only when said screw rotates in a direction to lower said slide member.

7. The apparatus recited in claim 6 in which the means sensitive to the rotational direction of said screw comprises a spring loosely engaging a cylindrical portion of said safety nut and having one end engaged with said bearing nut, whereby upon one direction of screw rotation the spring grips said safety nut to move it relative to the screw in the same manner as said bearing nut, whereas upon screw rotation in the opposite direction, said safety nut is permitted free rotation relative to said spring and said bearing nut.

8. The apparatus recited in claim 5 in which said automatic stopping device includes means to interrupt screw rotation in response to separation of said slide member and said bearing nut whereby lowering rotation of said screw will be interrupted upon said lifting arm assembly encountering an obstacle.

9. The apparatus recited in claim 8 in which said screw rotation interrupting means includes a rod element, an arm pivoted on a lateral spindle carried by said bearing nut and having an opening through which said rod element extends, means normally holding said arm against a stop on said slide member when the trunnions on said bearing nut are engaged in said slots on said slide member so that relative movement between the bearing nut in the slide effects angular movement of said arm to engage the rod and to interrupt screw rotation.

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