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(72) Inventor: **Vignoli, Giuliano**
41100 Modena (IT)

(74) Representative:
Modiano, Guido, Dr.-Ing. et al
Modiano Gardi Patents,
Via Meravigli, 16
20123 Milano (IT)

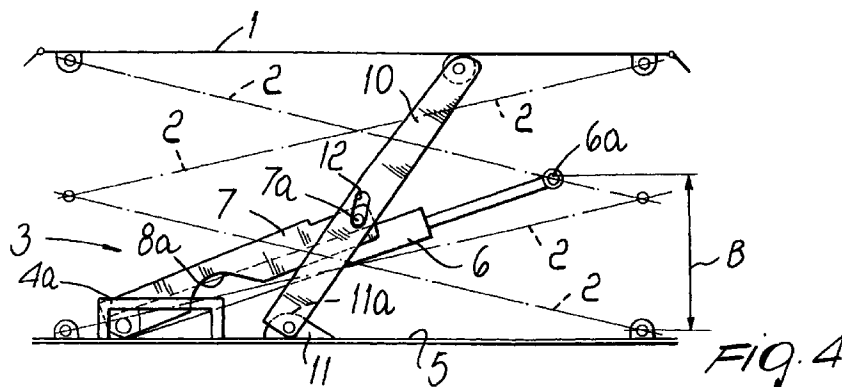
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(71) Applicant: **GIULIANO S.r.l.**
42015 Correggio (Reggio Emilia) (IT)

(54) Linkage with reduced starting load for moving the ramps of compact auto lifts for motor vehicles

(57) A linkage with reduced starting load for moving the ramps (1) of compact auto lifts comprising a base carriage (4) which can slide at floor level on a corresponding footing (5) and has a preset horizontal stroke, an end of a fluid-actuated actuator (6) and a contiguous end of a linkage element (7) being respectively coarticulated to said carriage (4), the length of said actuator (6) being axially variable, said linkage element (7) having eccentric means (8) for a partial rotation of said linkage

element (7) on a vertical plane, the opposite end of said linkage element (7) being in turn slidingly articulated in a hinge-like manner, by way of corresponding articulation means (9), to the body of a lever (10) for lifting the corresponding ramp (2) by contact, the opposite end of said actuator (6) being articulated to a rod-like member (2) which composes a pantograph structure for lifting said ramps (1).



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Description

[0001] The present invention relates to a linkage with reduced starting load for moving the ramps of compact auto lifts for motor vehicles.

[0002] Auto lifts have long been manufactured and used in car workshops, said lifts having the advantageous characteristic of being compact in a vertical direction, to the point that they do not prevent the normal transit of vehicles over them when they are not in use and are arranged in their fully lowered configuration.

[0003] Said auto lifts can, according to requirements, be installed either so as to fully retract into adapted pits provided in the floor surface or so as to lay flat directly thereon.

[0004] In both cases, the problem arises of allowing the thrust of the fluid-driven cylinders to be effective in the starting step, when the cylinders bear the weight of a vehicle on the ramps.

[0005] In order to minimize the vertical dimensions, said cylinders are in fact arranged so that when the ramps are fully lowered the cylinders lie practically horizontally.

[0006] Accordingly, during starting there is no lever arm at all to allow the cylinders to overcome the force of the load and begin the stroke for the actual lifting of the overlying vehicles.

[0007] In order to solve this problem, prior art includes several provisions which allow, by using the small clearance between the floor surface and the floor pan of the vehicle, to make one end of the cylinders travel for a first extent, equal to the clearance, by rotating on a vertical plane which substantially coincides with the axis of said cylinders, so that they are substantially not loaded along said extent and so that at the same time the rotation of one end causes the eccentricity that is necessary to provide a lever arm which then allows to generate a lifting moment sufficient to overcome the total load.

[0008] These known provisions consist substantially in a variety of crank systems which, being variously articulated to each other, dynamically move the fulcrum points at the beginning of the expansion stroke of the cylinders that move the ramps.

[0009] However, such crank systems are complicated to provide in practice, since they are composed of a considerable number of levers and joints, all of which must accordingly be sized adequately to overcome the loads and, most of all, must be able to be accommodated, folded and retracted, when the ramps are lowered completely.

[0010] The aim of the present invention is to solve the above problem of the prior art by providing a linkage with reduced starting load for moving the ramps of compact auto lifts which is simple to provide, safe in operation, and substantially compact with respect to conventional ones.

[0011] This aim, this object and others, which will

become more apparent hereinafter, are achieved by a linkage with reduced starting load for moving the ramps of compact auto lifts, characterized in that it comprises a base carriage which can slide at floor level on a corresponding footing and has a preset horizontal stroke, an end of a fluid-actuated actuator and a contiguous end of a linkage element being respectively coarticulated to said carriage, the length of said actuator being axially variable, said linkage element having eccentric means for the partial rotation of said linkage element on a vertical plane, the opposite end of said linkage element being in turn slidingly articulated in a hinge-like manner, by way of corresponding articulation means, to the body of a lever for lifting the corresponding ramp by contact, the opposite end of said actuator being articulated to a rod-like member which composes a pantograph structure for lifting said ramps.

[0012] Further characteristics and advantages of the invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of a linkage with reduced starting load for moving the ramps of compact auto lifts, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figures 1 to 4 are side views of the linkage according to the invention in the corresponding initial steps for lifting one of the ramps of an auto lift.

[0013] With particular reference to the above figures, the reference numeral 1 schematically designates one of the ramps of an auto lift.

[0014] The conventional rod-like members 2 that compose a pantograph-like lattice for upward and downward vertical movement, shown in Figure 4 schematically with longitudinal axes, are connected to ramp 1.

[0015] A corresponding linkage 3 for moving the ramps 1 with a reduced starting load is mounted in parallel to each lattice.

[0016] The linkage 3 essentially comprises a base carriage 4 which can slide at floor level on a footing 5 which usually coincides with the footing of the corresponding lattice frame and has a preset horizontal stroke.

[0017] One end of a fluid-actuated actuator with axially variable length, constituted by a cylinder 6 in the specific case, and a contiguous end of a linkage element 7 provided with eccentric means adapted to produce a partial rotation thereof in a vertical plane, are respectively coarticulated to the carriage 4. The opposite end of the linkage element 7 is in turn slidingly articulated by means of a hinge 7a, with corresponding articulation means 9, to the body of a lever 10 for lifting the corresponding ramp 1 by contact.

[0018] The opposite end of the cylinder 6 is articulated in 6a to one of the rod-like members 2 that composes, as mentioned, the usual pantograph-like structure.

[0019] The eccentric means 8 are constituted by a

concave portion 8a with a circular arc-like profile which blends with a straight portion formed in the lower median portion of the linkage 7; the concave portion 8a is adapted to slide and mate, by resting, with a corresponding wing 11 that protrudes upward from the footing 5 and has, in an upward region, a adapted convex profile 11a which is complementary to the concave portion 8a; the base of the lever 10 is also articulated to the wing.

[0020] The articulation means 9 are constituted by the hinge 7a, which is slidingly guided in a corresponding slot 12 having a preset length and provided in the lever 10.

[0021] The slot 12 is arranged diagonally with respect to the longitudinal axis of the lever 10 in which it is formed, and its end that lies distally with respect to the base of said lever 10 is directed upward.

[0022] The operation of the invention is as follows: when the ramps 1 of the auto lift are fully lowered into the most compact configuration, the cylinders 6, the linkage elements 7 and the levers 10 lie mutually side by side and the convex profiles 11a are fitted in the corresponding concave portions 8a.

[0023] When movement begins, the cylinders 6 begin their extension step and gradually move the carriages 4 in the guides 4a that control their overall stroke.

[0024] As the displacement increases, the hinges 7a move in the slots 12, abutting against their lowest end, and the concave profiles 8a slide along the convex profiles 11a: this causes a gradual upward rotation of the linkage elements 7, which in turn draw the levers 9.

[0025] The levers are in contact, through their upper ends, with the lower faces of the ramps 1 and transmit thereto the gradual lifting induced by the linkage elements 7.

[0026] The carriages 4 reach the maximum extent of their stroke and the articulation points of the upper ends of the cylinders 6 gradually rise, generating the necessary lever arms, designated by B in Figure 4, which allow, thanks to a subsequent further extension of the cylinders 6, to applying the lifting moment that is required to easily move upward the ramps 1 loaded with a motor vehicle.

[0027] It has thus been observed that the described invention achieves the intended aim and objects.

[0028] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0029] All the details may also be replaced with other technically equivalent elements.

[0030] In practice, the materials employed, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0031] The disclosures in Italian Patent Application N. MO98A000104 from which this application claims priority are incorporated herein by reference.

[0032] Where technical features mentioned in any

claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A linkage with reduced starting load for moving the ramps of compact auto lifts, characterized in that it comprises a base carriage which can slide at floor level on a corresponding footing and has a preset horizontal stroke, an end of a fluid-actuated actuator and a contiguous end of a linkage element being respectively coarticulated to said carriage, the length of said actuator being axially variable, said linkage element having eccentric means for a partial rotation of said linkage element on a vertical plane, the opposite end of said linkage element being in turn slidingly articulated in a hinge-like manner, by way of corresponding articulation means, to the body of a lever for lifting the corresponding ramp by contact, the opposite end of said actuator being articulated to a rod-like member which composes a pantograph structure for lifting said ramps.
2. The linkage according to claim 1, characterized in that said eccentric means are constituted by a concave portion with a circular arc-like profile which is blended with a straight portion formed in a lower median portion of said linkage element, said concave portion being slidingly associable, by resting thereon, with a corresponding wing which protrudes upward from said footing and has a convex profile which is complementary to the profile of said concave portion, the base of said lever being articulated to said wing.
3. The linkage according to claim 1, characterized in that said articulation means are constituted by said hinge, which is slidingly guided in a corresponding slot of preset length provided in said lever.
4. The linkage according to claim 3, characterized in that said slot is arranged diagonally with respect to the longitudinal axis of said lever so that the end that is distal with respect to the base of said lever is directed upward.
5. The linkage according to claim 3, characterized in that said hinge slidingly guided in said slot reaches the lower abutment portion of said slot, gradually raising it substantially at a second half of the stroke of said base carriage, a first half of the stroke of said base carriage causing the sliding of said concave portion on the corresponding wing.

6. The linkage according to claim 4, characterized in that the completed active stroke of said carriage corresponds to the maximum elevation of said lever.

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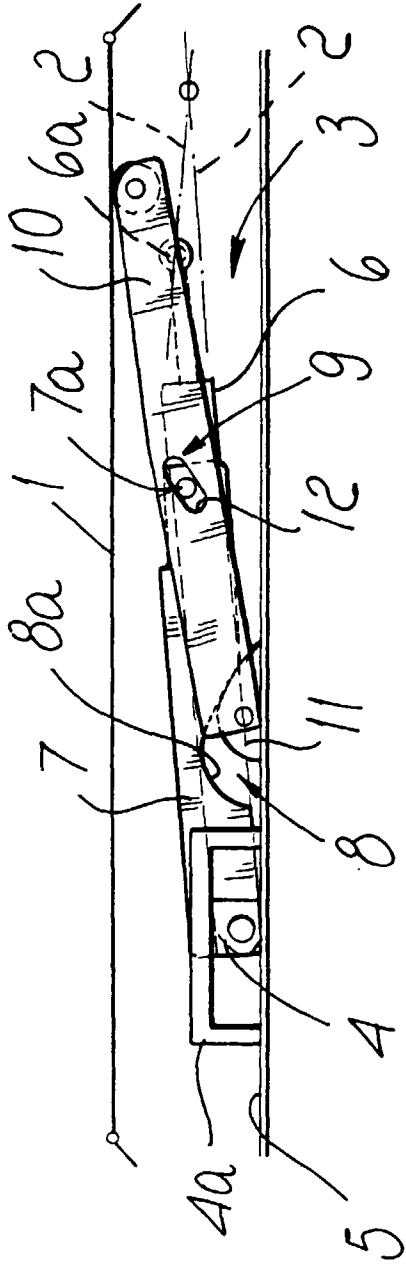


Fig. 1

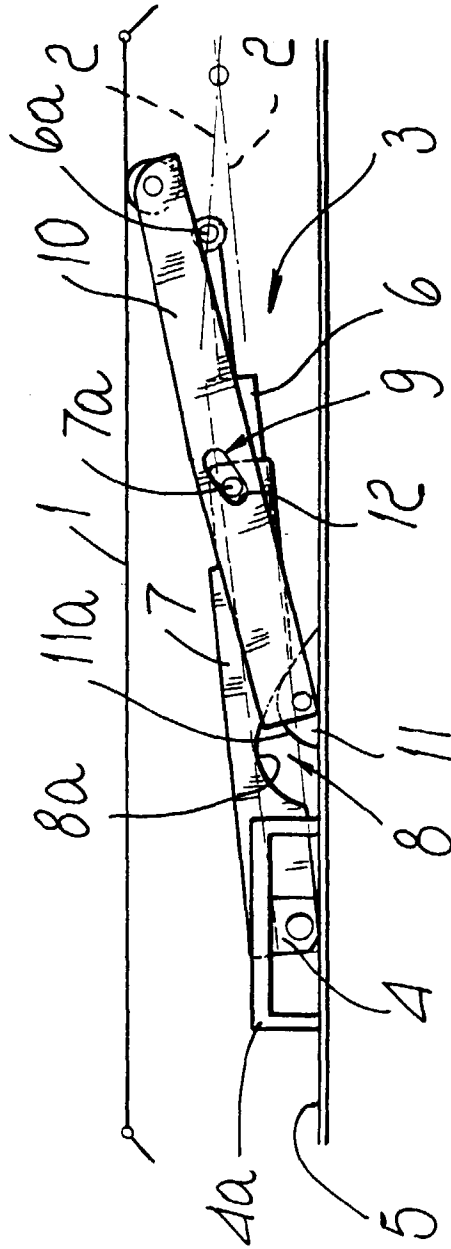


Fig. 2

