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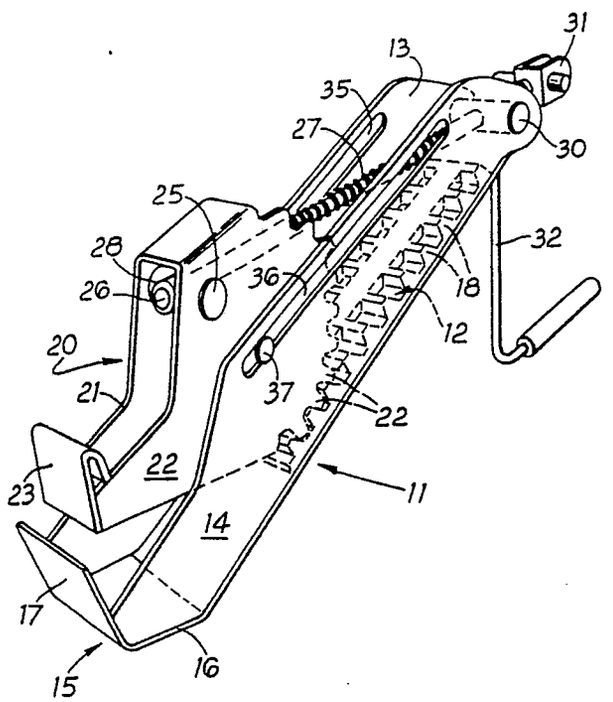
(54) Vehicle jack.

(57) The jack comprises a leg (11) provided with a foot (15). An arm (20) is mounted for angular movement relative to the leg (11) and carries a formation (23) for engagement with a vehicle. A screw is mounted between the leg and the arm and engages a nut (30) on the leg, for angularly raising and lowering the arm relative to the leg. The leg has a rack of teeth (18) and the arm has an arcuate row of teeth (22) meshed with the rack teeth, so that, as the arm is moved angularly the arm rides up the leg to vary the position of the centre of rotation of the arm relative to the leg.



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VEHICLE JACK

This invention relates to a vehicle jack.

The invention is concerned with the type of jack which has a support provided with an arm angularly movable relative to the support by operating means. The arm is provided with a formation for engaging with a part of a vehicle, whereby the vehicle may be lifted as the operating means is actuated.

A jack of this type is disclosed in GB-A-2053846. In this prior art jack, the support comprises an elongate leg and the arm is pivoted to the leg at a fixed point between its ends. The leg is mounted at its lower end on a foot and the foot is capable of rolling from a start position to an operative position. The operating means comprises a screw extending between the upper end of the leg and the arm. Jacks of this general type are currently the most commonly used for motor cars.

One disadvantage of the jack disclosed in GB-A-2053846 is that the potential load on the screw is very high as the arm first takes a load and this load reduces as the lift increases. This characteristic, makes it difficult to operate the jack at the start of lift if under load. Conversely, the degree of lift for each turn of the screw reduces as the lift increases, so that substantial rotation of the screw is required for little gain in lift as the jack approaches maximum height.

The present invention provides a jack which can overcome these problems and enables the jack to be smaller and lighter than has formerly been possible for the same lift.

US-A-2560797, published in 1946, disclosed a proposal for a jack in which the arm was pivoted to the support at a fixed point and a wedge was forced between the arm and the support in order to separate them and thereby cause the arm to lift. The wedge was threaded on the screw, so that the wedging action was effected by turning of the screw. This arrangement results in exceptionally high loads on the screw and the wedge to an extent such that it is impractical, to construct a jack of this design capable of lifting a motor vehicle.

GB-A-1091036 discloses a vehicle jack in which a hydraulic cylinder is actuable to move an arm along an upwardly extending support. The arm is pivotally moved by actuation of a separate hydraulic cylinder. This is a complex and expensive arrangement.

GB-A-265575 discloses a rail lifting device which utilises a ratchet lever for moving a pinion along a toothed sector so as to lift an arm pivotted to the member provided with the toothed sector.

GB-A-1199020 discloses a vehicle jack in which the arm of a side-lift type jack is pivotted to a nut which rides along a mains upright support of the jack.

The present invention provides a vehicle jack of the type known from GB-A-2053846 comprising a base, a support extending upwardly from the base, an arm mounted on the support for angular movement relative thereto, means mounted on the arm including a formation for engagement with a part of a vehicle, and elongate operating means pivotally connected between the support and the arm and actuable to draw the arm angularly towards the support to raise the arm and effect lift. The invention is characterised in that the arm is movably mounted on the support so as to be moved under the influence of the operating means along the support relative to the base as the arm is moved angularly by the operating means.

The operating means is conveniently a screw as is usual in current jacks, one of the pivotal connections including a nut engaged with the screw.

Preferably, the arm is provided with an arcuate row of teeth meshed with a row of teeth on the support, whereby the arm rolls along the support as the operating means is actuated. The row of teeth on the support may be substantially linear or may be arcuate along a convex surface.

The support may comprise an elongate leg having the pivotal connection with the screw located adjacent an upper end and having a foot secured to the lower end. In one embodiment, the foot has adjacent relatively angled surfaces, one surface defining a setting up surface for the start of a jacking operation, the jack rolling onto the other surface during lift. In another embodiment, the leg is pivotally mounted on the foot. Arrangements of both types are known per se.

In either embodiment, it is preferred that the formation, for engaging with a part of the vehicle, is located substantially directly above the foot and said relative movement of the arm and the support maintains this location in all operative positions.

The jack of the present invention is constructed so that the fulcrum positions of the constituent members vary during operation. It is possible to formulate the rolling surfaces between the arm and the support and the pivotal positions for the screw to provide desired patterns of rate of lift and desired patterns of screw load. The construction according to the invention permits the load, if desired, on the screw to be generally constant during lift and for the rate of lift also to be generally constant.

Reference is now made to the accompanying drawing, wherein the sole figure is a perspective view of a vehicle jack according to the inven-

tion.

The jack shown comprises an elongate support, or leg 11 of channel form having a base 12 and opposite sides 13, 14. The base is shaped at a lower end of the jack to define a foot 15 having a setting up surface 16 and a main support surface 17 angled to the setting up surface.

A substantial part of the base is provided internally of the channel with a substantially linear row of teeth 18 spaced longitudinally of the leg.

An arm 20 is mounted on the leg within the channel for angular movement relative to the leg. The arm is also of channel shape, having a pair of spaced, parallel plates 21, 22. The arm is provided, at the end remote from the leg, with a formation 23 for engaging with a part of a vehicle. The formation bridges the plates and strengthens the construction. At the opposite end, the arm is provided on convex surfaces of the two plates with arcuate rows of teeth 22. The arcuate teeth 22 and the linear teeth 18 are designed so that the arm 20 cam roll along the base 23 with the teeth in mesh.

A pivot pin 25 is mounted between the plates 21, 22 and radially receives a head 26 of a screw 27. A bearing yoke 28 is located on the screw between the head and the pivot pin in conventional manner.

A nut 30 is pivotally mounted between the sides 13, 14 of the leg at the end remote from the foot 15. The screw 27 is engaged with the nut and the end part of the screw, remote from the head 26 carries a mounting member 31 for a crank handle 32.

The sides 13, 14 of the leg are provided with elongate slots 35, 36, parallel to the base 12 and the linear row of teeth 18. A headed pin or roller 37 projects from each plate 21 and 22 and engages in a corresponding one of the slots 35, 36.

In use, the jack is arranged supported on the setting up surface 16 whilst the arm 20 is raised until the formation 23 engages with a vehicle. In order to raise the arm, the handle 32 is rotated to turn the screw 27, so that the pivot pin 25 is drawn towards the nut 30. This operation causes the convex teeth 22 to roll along the linear teeth 18 up the leg 11 of the jack. This movement causes lifting of the formation 23, both by the angular motion of the arm and the linear component of the rolling motion. The pins or rollers 37 guide the arm and, by their engagement in the slots 35, 36, retain the integrity of the jack. As the jack begins to lift, the leg tilts onto the main support surface 17 in known manner.

In the embodiment described, the potential load on the screw remains substantially constant during lift and the rate of lift is substantially constant. In the fully raised position, the arm is located near to the upper end of the leg and this allows the jack to be shorter than is possible for an equivalent jack of the type shown in GB-A-2053846. The jack of the invention can, therefore, be smaller, lighter and easier to operate than existing jacks.

The leg 11 may be provided with a convex, arcuately arranged row of teeth instead of the linearly arranged teeth 18.

Flexibility in the formulations of the curvatures of the two rows of teeth is allowed by the invention. Suitable geometry can be achieved for a wide range of curved surfaces such that the desired proportion of lift and screw load can be achieved. The teeth on leg 11 may lie on an arc whose curvature varies from an infinite radius to a small radius whilst the teeth on the arm 22 may lie on the arc which varies from small radius to infinite radius. Matching the two radii with suitable positions of the screw bearing points provides the desired characteristics. A particularly elegant solution exists when the two surfaces are circular and the radii are equal.

Claims

1. A vehicle jack comprising a base (12), a support (11) extending upwardly from the base, an arm (20) mounted on the support for angular movement relative thereto, means mounted on the arm including a formation (23) for engagement with a part of a vehicle, and elongate operating means (27) pivotally connected between the support (11) and the arm (20) and actuable to draw the arm angularly towards the support to raise the arm and effect lift, characterised in that the arm (20) is movably mounted on the support (11) so as to be moved under the influence of the operating means (27) along the support relative to the base (12) as the arm is moved angularly by the operating means.

2. A vehicle jack according to Claim 1, wherein the arm (20) is provided with an arcuate row of teeth (22) meshed with a row of teeth (18) on the support (11), whereby the arm rolls along the support as the operating means (27) is actuated.

3. A vehicle jack according to Claim 2, wherein the row of teeth (18) on the support is substantially linear.

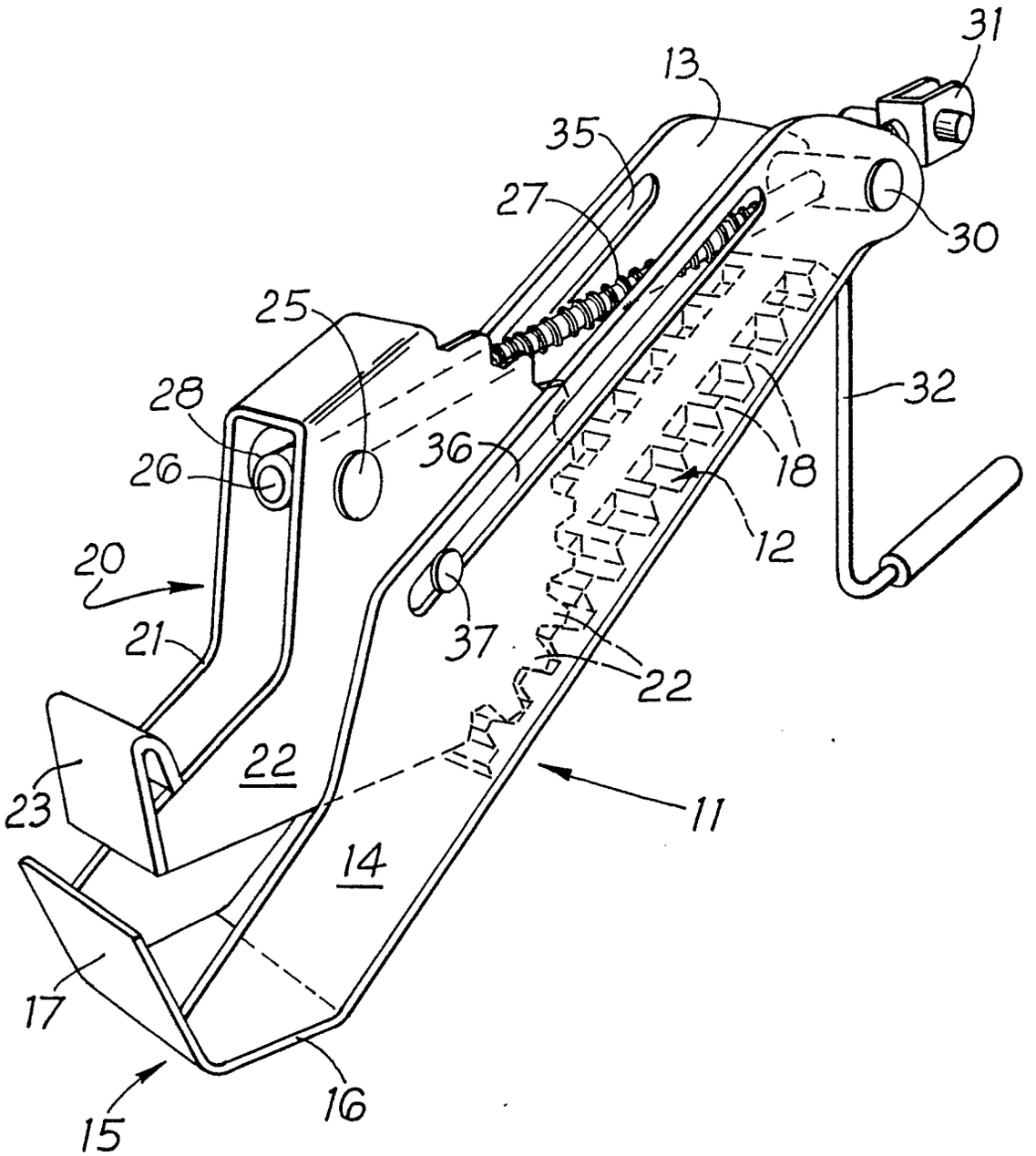
4. A vehicle jack according to Claim 2, wherein the row of teeth is arcuate along a convex surface.

5. A vehicle jack according to Claim 2, 3 or 4, wherein the support comprises an elongate leg (11) secured at one end to the base (12) and the operating means comprises a screw (27) which extends between the arm (20) and the leg (11) and

is pivotally connected to both, one of the pivotal connections including a nut (30) engaged with the screw.

6. A vehicle jack according to any preceding claim, wherein said formation (23) is directly mounted on the arm (20).

7. A vehicle jack according to any preceding claim, wherein said formation (23) is located substantially directly above the base (12) in the operative position of the jack and this position is maintained during relative movement of the arm (20) and the support (11).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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 3366

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US-A-2 121 861 (DICKERSON) * Whole document *	1	B 66 F 3/12
X	EP-A-0 226 695 (FORD-WERKE) * Abstract; figure 5 *	1	
A	US-A-2 973 939 (RYERSON) * Whole document *	2,3	
A	DE-C- 70 706 (BRYANT et al.) * Figures 1-6 *	4	
A	DE-A-2 453 260 (ALFRED TEVES) * Page 4, last paragraph *	5,6	
A	DE-B-1 175 406 (E.A. STORZ)		
A	DE-B-1 073 710 (NORDDEUTSCHE SCHRAUBEN- UND MUTTERNWERKE)		
A	DE-B-1 273 160 (E.A. STORZ)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
D,A	GB-A-1 091 036 (LARSSON)		B 66 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30-06-1989	VAN DEN BERGHE E.J.J.

CATEGORY OF CITED DOCUMENTS

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