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(54) Scissor Lift

(57) A scissor lift is disclosed comprising two leg members (3,4) interconnected by a pivot (9). Each leg member has a roller (6,8) at one end and a fixed pivot (5,7) at the other end, the central pivot (9) lying nearer one end of each leg than the other and lying below the axis between the fixed pivot and roller of each leg. This arrangement reduces the force required to spread the legs apart to act as a scissor lift.

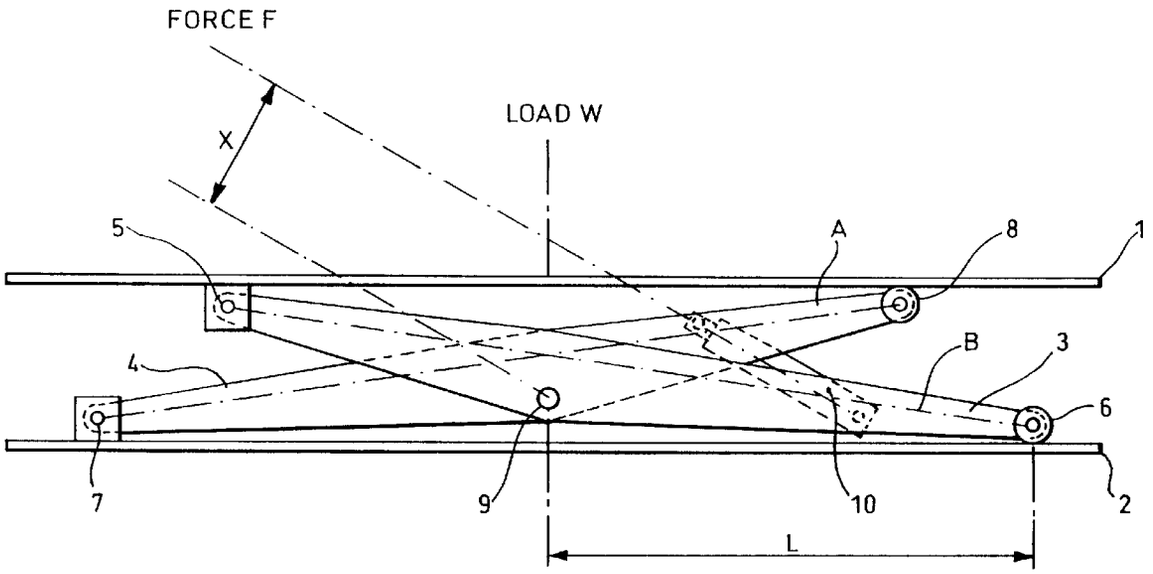

Fig.2.

EP 0 805 120 A2

Description

This invention relates to scissor lifts.

A currently available scissor lift is shown in Figure 1 and comprises a load carrying platform 1 with bracing members and a base frame 2. Between the platform 1 and the bottom frame 2 is arranged a first leg 3 comprising two parallel spaced apart outer leg members each connected at one end to the load carrying platform 1 by means of a fixed pivot 5 and provided at the other end with a freely rotatable roller 6, and a second leg 4 comprising two parallel spaced apart inner leg members each connected at one end to the base frame 2 by a fixed pivot 7 and provided at the other end with a freely rotatable roller 8. The two legs 3 and 4 are interconnected by a common central pivot 9 and by at least one ram 10 pivotally connected at one end to the first leg 3 and at the other end to the second leg 4 such that when the ram 10 is actuated the legs 3 and 4 rotate in opposite directions about the central pivot 9 whereby the platform is raised and lowered. The fixed pivot 5, roller 6 and central pivot 9 of the first leg 3 are situated on a common axis Al. The fixed pivot 7, the roller 8 and the central pivot 9 of the second leg 4 are also situated on a common axis Bl so that as the first and second legs 3 and 4 are rotated in opposite directions, the load carrying platform 1 moves parallel to the base. The distances between the fixed pivot 5 and the central pivot 9 of the first leg 3 and the distances between the fixed pivot 7 and the central pivot 9 are equal to the distance between the roller 8 and the central pivot 9 of the second leg 4 so that the pivot 5 and the load carrying platform moves along a straight vertical axis.

The ram force F needed to spread apart the legs 3 and 4 so as to raise the platform 1 can be calculated from the equation:-

$$F = \frac{W.L}{X}$$

Where W is the total load to be lifted, including the weight of the load carrying platform 1 and the legs 3 and 4. L is the horizontal distance between the centre of the roller 6 and the centre of the central pivot 9 and *X* is the lever arm, ie the perpendicular distance between the axis of the ram 1 and a line which is nearest to and parallel to the axis of ram 10 and intersects the axis of the central pivot 9 (ie the axis of rotation of the legs 3 and 4).

Clearly, at the lowest position the lever arm *X* is reduced and a large ram force F is needed to spread the scissor legs 3 and 4 apart.

The present invention arose in an attempt to provide an improved scissor lift in which the force F is reduced.

According to the present invention there is provided a scissor lift comprising a load carrying platform, a base frame, a first and second leg unit situated between the platform and the frame, the leg units crossing each other at an axis and being pivotally interconnected at said axis, the first leg being connected at one end to the load carrying platform by first fixed pivot means and provided at the other end with first freely rotatable roller means; the second leg unit being connected at one end to the base frame by second fixed pivot means and provided at the other end with second freely rotatable roller means, the distance between the first fixed pivot means and the interconnecting pivot and the first freely rotatable roller means and the interconnecting pivot being different and the position of the interconnecting pivot axis being not on the axis between the first fixed pivot and the centre of the first freely rotatable roller, the distance between the second fixed pivot means and the interconnecting pivot and the second rotatable roller means and the connecting pivot being different and the position of the interconnecting pivot axis being not on the axis between the second fixed pivot and the second freely rotatable roller, ram means being provided to act upon the leg units.

An embodiment of the present invention will now be described, by way of example only, with reference to the accompanying, in which:

Figure 1 shows schematically a side view of a previously proposed scissor lift; and
Figure 2 shows schematically a side view of a scissor lift according to the present invention.

The scissor lift in Figure 2 comprises a load carrying platform with bracing members 1 and a base frame 2. Between the platform 1 and the base frame 2 is arranged a first leg 3 comprising two spaced apart parallel inner leg members connected at one end to the underside of the platform 1 by means of a fixed pivot 5 and at the other end by a freely rotatable roller 6 rotating on a central pivot and contacting the underside of the base frame 2, and a second leg 4 comprising two spaced apart parallel inner leg members connected at one end to the base frame 2 by means of a fixed pivot 7 and at the other end by a freely rotatable roller 8 rotating on a central pivot and contacting the load carrying platform 1. The inner and outer legs 3 and 4 are connected to each other by a common pivot 9.

The arrangement of the said pivots 5, 9 and 6 on the outer leg 3 and the pivots 7, 9 and 8 on the inner leg are such that the connecting pivot 9 is offset below an axis A between the centre of the fixed pivot 7 and the roller centre pivot 8 and also below axis B between the centre of the fixed pivot 5 and the roller 6.

The distance between the fixed pivot 5 and the connecting pivot 9 is different to the distance between the centre of the roller pivot 6 and the connecting pivot 9 on the outer leg 3. Further, the distance between the fixed pivot 7 and the connecting pivot 9 is different to the distance between the centre of the roller pivot 8 and the connecting pivot 9 on the inner leg 4. The distance between the fixed pivot 5 and the connecting pivot 9 on the outer leg is the same as the distance between the centre

of the freely rotatable roller 8 and the connecting pivot 9 on the inner leg 4 and the distance between the fixed pivot 7 and the connecting pivot 9 on the inner leg 4 is the same as the distance between the centre of the freely rotatable roller 6 and the connecting pivot 9 on the outer leg member 3. The outer leg 3 and the inner leg 4 are assembled symmetrically opposite to each other about the vertical axis through the connecting pivot 9.

At least one ram 10, preferably hydraulically actuated, is freely pivoted between a member connecting the two outer legs 3 and a member connecting the two inner legs 4, or positioned otherwise to act upon the legs, such that when the ram is extended the legs 3 and 4 rotate in opposite directions about the connecting pivot 9 which forces the load carrying platform 1 and the base frame 2 apart and hence the load carrying platform rises. As the ram 10 is retracted the legs 3 and 4 rotate in the opposite direction and the load carrying platform 1 lowers.

It is apparent from the arrangement described in Figure 2 that, when the formula $F = \frac{W.L}{X}$ is applied, the lever arm *X*, ie the perpendicular distance between the axis of the frame 10 and a line which is nearest to parallel to the axis of the frame 10 and which intersects the axis of the centre of the connecting pivot 9, is greater than that of the prior art scissor lift of Figure 1 and will therefore require a smaller force F to overcome the load W.

It can be ascertained that due to the dissimilar distances between the connecting pivot 9 and the fixed pivots 5 and 7 and the freely rotatable rollers 6 and 8 the fixed pivot 5 and hence the loading carrying platform will not travel in a vertical path, however the offset of the connecting pivot 9 from the axes between the first part and the fixed pivot 5 and the freely rotatable roller 6 on the outer leg member 3 and on the second part the fixed pivot 7 and the freely rotatable roller 8 of the inner leg 4 mitigates this disadvantage so that generally vertical, parallel, travel of the platform occurs.

In the example shown, the distance between fixed pivot 5 and pivot 9 is less than that between pivot 9 and roller 6. Alternatively, the distance between fixed pivot 5 and pivot 9 may be greater than that between pivot 9 and roller 6. The inner leg will be configured accordingly, mutatis mutandis.

Claims

1. A scissor lift comprising a load carrying platform, a base frame, a first and second leg unit situated between the platform and the frame, the leg units crossing each other at an axis and being pivotally interconnected at said axis, the first leg being connected at one end to the load carrying platform by first fixed pivot means and provided at the other end with first freely rotatable roller means; the second leg unit being connected at one end to the base frame by second fixed pivot means and provided at the other end with second freely rotatable roller means, the distance between the first fixed pivot means and the interconnecting pivot and the first freely rotatable roller means and the interconnecting pivot being different and the position of the interconnecting pivot axis being not on the axis between the first fixed pivot and the centre of the first freely rotatable roller, the distance between the second fixed pivot means and the interconnecting pivot and the second rotatable roller means and the connecting pivot being different and the position of the interconnecting pivot axis being not on the axis between the second fixed pivot and the second freely rotatable roller, ram means being provided to act upon the leg units.

2. A scissor lift as claimed in Claim 1, wherein the distance between the first fixed pivot means and the interconnecting pivot is less than the distance between the interconnecting pivot and the first roller means.

3. A scissor lift as claimed in Claim 1, wherein the distance between the first fixed pivot means and the interconnecting pivot is greater than the distance between the interconnecting pivot and the first roller means.

4. A scissor lift as claimed in any of the preceding claims, wherein the position of the interconnecting pivot axis is below the axis between the first fixed pivot means and the centre of the first freely rotatable roller, and below the axis between the second fixed pivot means and the centre of the second freely rotatable roller.

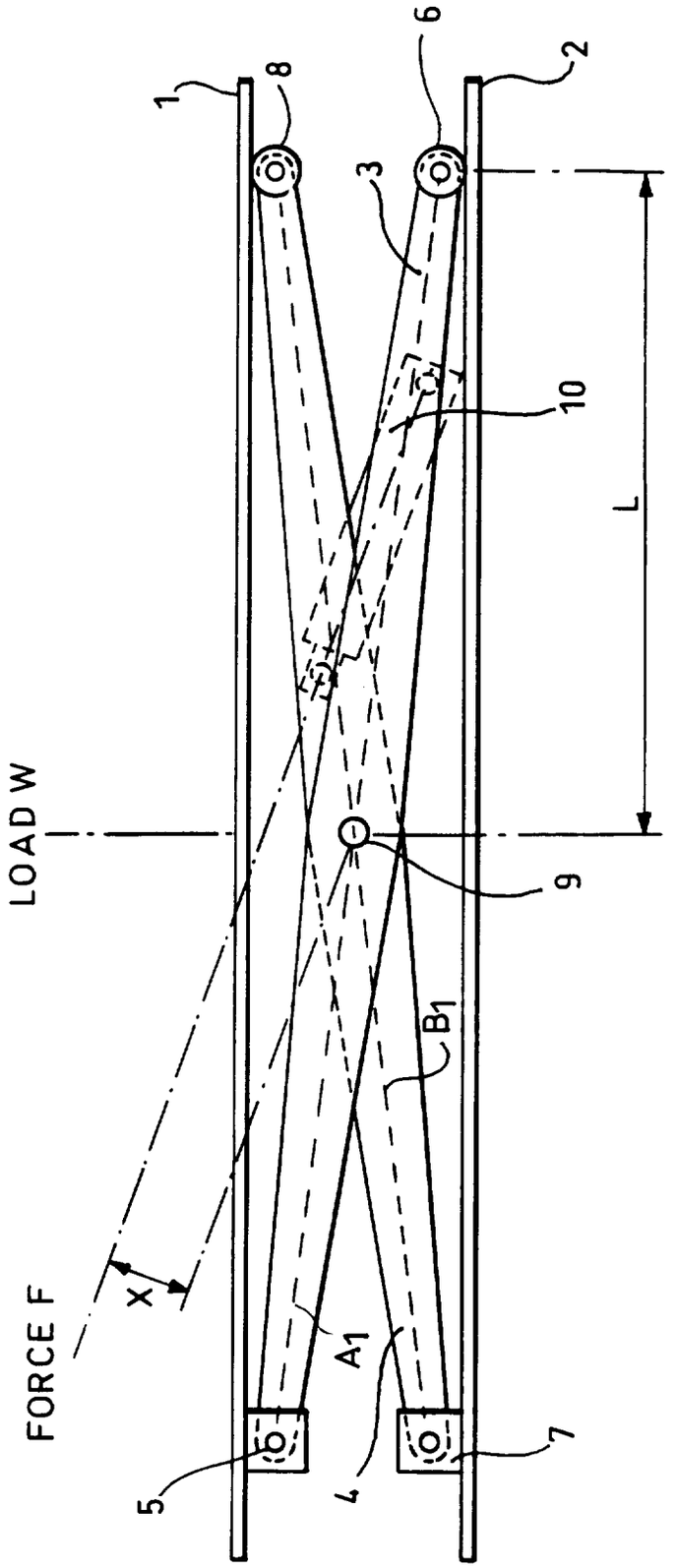

Fig.1.

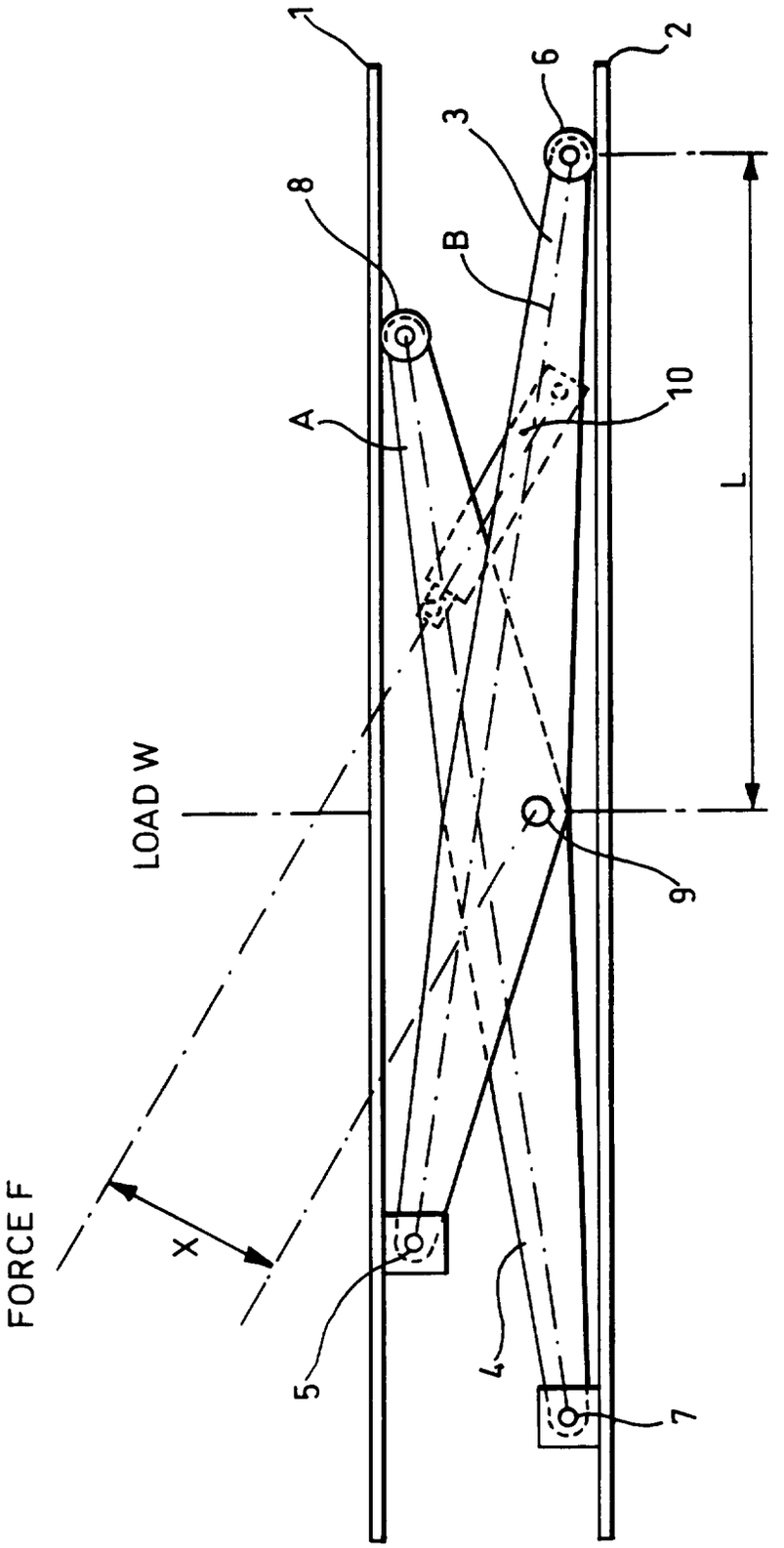

Fig.2.