May 17, 1960 J. L. CROLL 2,937,003

HYDRAULIC LIFT

Filed Oct. 12, 1956 2 Sheets-Sheet 1

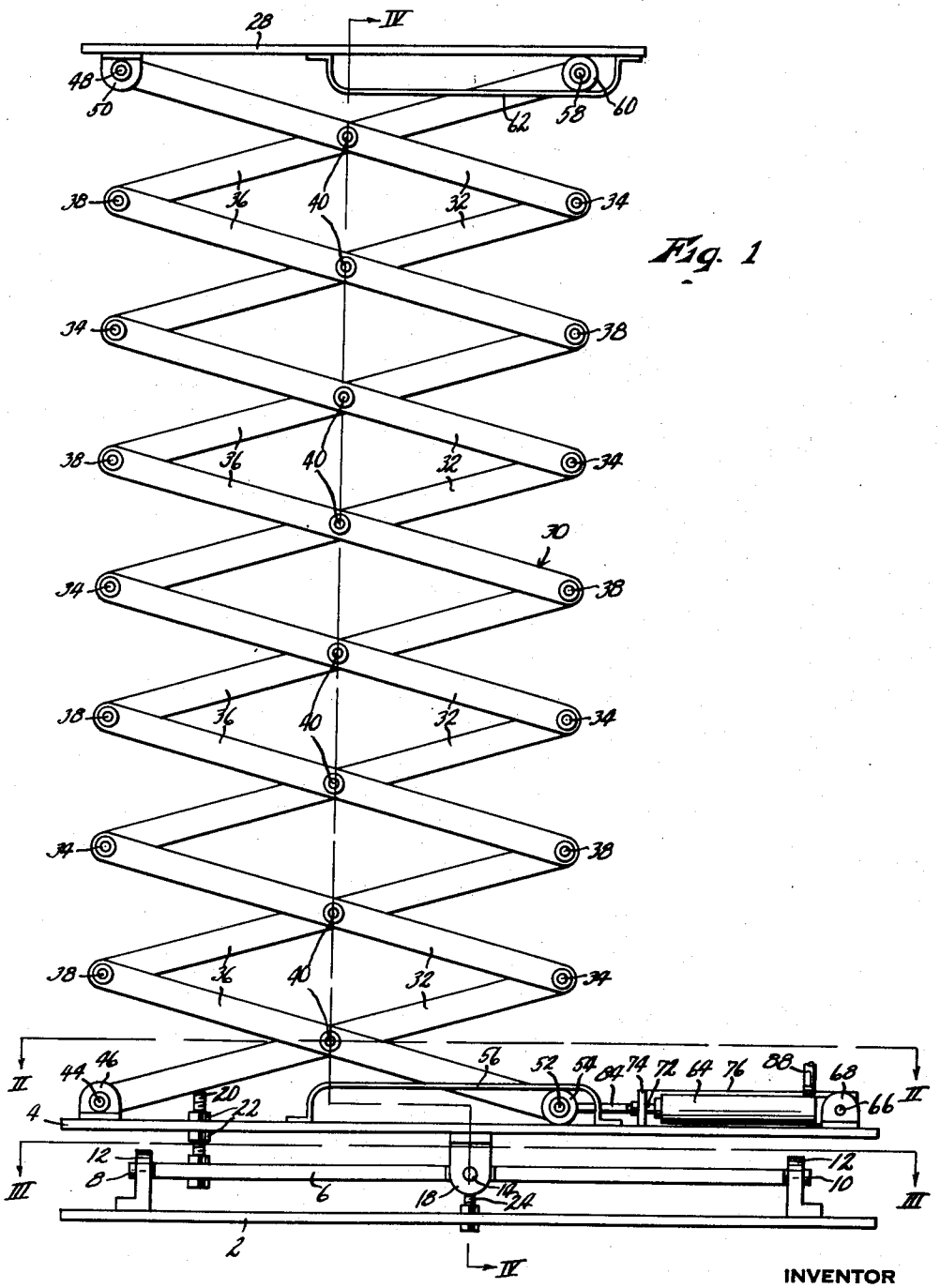



Fig. 1

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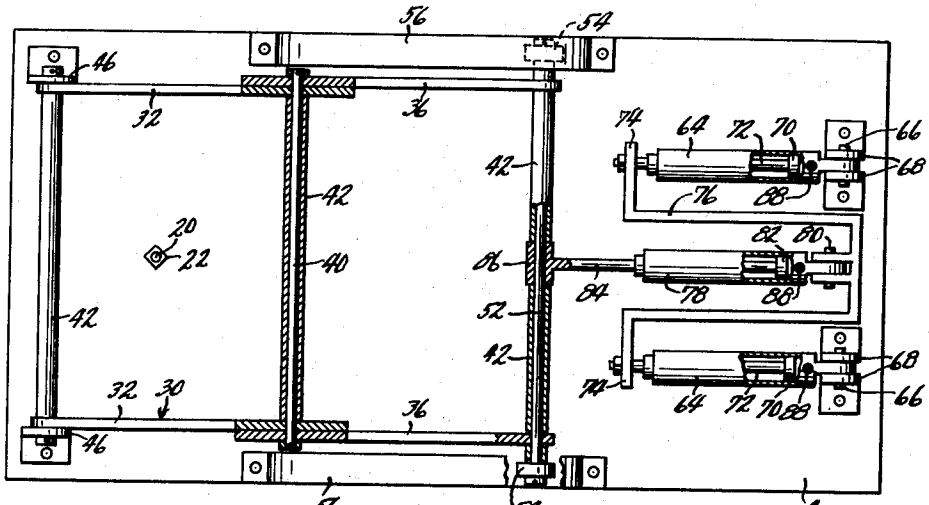


Fig. 2

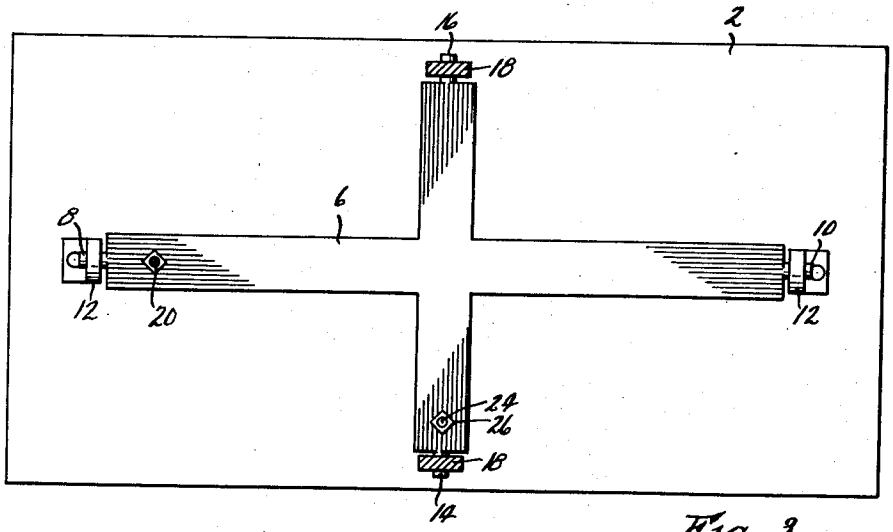


Fig. 3

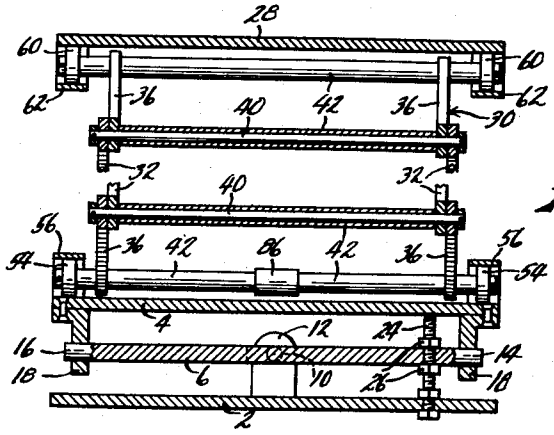


Fig. 4

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2,937,003

# HYDRAULIC LIFT

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Application October 12, 1956, Serial No. 615,612

2 Claims. (Cl. 254—93)

This invention relates to new and useful improvements in hydraulic lifts, and has as its principal object the provision of a quick-acting lift suitable for such purposes as a fire escape or rescue apparatus, or for lifting workmen and equipment for working on utility lines and the like.

Another object is the provision of a lift of the character described which is very compact and economical in its space requirements, in order to facilitate mounting thereof on truck beds or other mobile vehicles.

A further object is the provision of a lift of the character described having novel means for levelling the bed thereof so that the lift may function in a truly vertical line, thereby facilitating use of the lift on mobile vehicles which may rest on sloping or uneven terrain.

Other objects are simplicity and economy of construction, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

Fig. 1 is a side elevational view of a hydraulic lift embodying the present invention, shown in a partially raised position,

Fig. 2 is a sectional view taken on line II—II of Fig. 1, with parts broken away,

Fig. 3 is a sectional view taken on line III—III of Fig. 1, and

Fig. 4 is a foreshortened sectional view taken on line IV—IV of Fig. 1.

Like reference numerals apply to similar parts throughout the several views, and the numeral **2** applies to a planar base which obviously could be supported either directly on the ground or floor, or on the bed of a truck, trailer, or other mobile vehicle. A planar bed **4** is disposed above and generally parallel to the base. Disposed between the base and the bed is a generally cross-shaped pivot member **6** having a stub axle at each of the four extremities thereof. One opposite and coaxial pair of said axles, designated by the numerals **8** and **10**, are journalled in bearings **12** affixed to base **2**. The other pair of axles **14** and **16** are disposed coaxially to each other and at right angles to axles **8** and **10**, are journalled in bearings **18** affixed to the lower surface of bed **4**.

Bed **4** may be adjustably tilted about axles **14** and **16** of pivot member **6** by means of a bolt **20** secured in member **6** adjacent axle **8** and extending upwardly through said bed. Said bolt is provided with a pair of lock nuts **22** disposed respectively above and below the bed. Pivot member **6** may be tilted relative to base **2**, about axles **8** and **10**, by means of a bolt **24** secured in base **2** and extending upwardly through member **6** adjacent axle **14**. Said bolt is provided with a pair of lock nuts **26** disposed respectively above and below member **6**. It will thus be apparent that by adjusting bolts **20** and **24**, bed **4** may be tilted universally with respect to the base, and may therefore be levelled accurately despite the fact that the base, or the vehicle supporting said base, may be resting on uneven or sloping terrain.

A platform **28** is supported above bed **4** by a double



"lazy Susan" linkage **20**, comprising a double set of links at each side of the bed. The links of one of said sets are designated by the numeral **32**, and are joined successively at their contiguous ends by pivots **34**. The links are disposed in zig-zag relation. The links of the other set are designated by the numeral **36**, and are joined successively at their contiguous ends by pivots **38**. Links **36** are also disposed in zig-zag relation, and so disposed that each link intersects the corresponding link **32**, and is pivoted thereto at **40**. Pivots **34**, **38** and **40** are all parallel, and are formed by shafts extending between the double sets of links at each side of the bed and serving as pivotal members for both of said link sets, thereby imparting rigidity to the linkages at right angles to their plane. The link sets at opposite sides of the bed are held spaced apart by spacer sleeve **42** carried on the pivot shafts **34**.

The lower ends of the lowermost links **32** are journalled on a shaft **44** parallel to pivots **34**, **38** and **40** and mounted in bearings **46** fixed to the upper surface of bed **4**. The upper ends of the uppermost links **32** are journalled on a shaft **48** mounted in bearings **50** affixed to the lower surface of platform **28**. The lower ends of the lowermost links **36** are journalled on a shaft **52** which is parallel to shaft **44**. Rotatably mounted on each end of shaft **52** is a roller **54** said rollers being operable to roll along the upper surface of bed **4** respectively at opposite edges thereof. Each of said rollers is retained against the bed by a keeper **56** affixed to the bed. The upper ends of the uppermost links **36** are similarly journalled on a shaft **58** on which are rotatably mounted rollers **60** which engage the lower surface of platform **28** and are retained against said platform by keepers **62** affixed to the platform.

It will be apparent that if shaft **52** carrying rollers **54** is moved horizontally toward shaft **44**, the linkage **30** will be vertically extended, thereby elevating platform **28** to a greater height, and that if shaft **52** is moved farther away from shaft **44**, the platform will be lowered. It will be obvious that platform **28** may carry workmen, supplies or equipment. Also, said platform could be fitted with lateral extensions, turntables and the like if desired. Such equipment, however, forms no part of the present invention and is not shown.

The equipment for moving shaft **52** horizontally as described is hydraulic, and is best shown in Fig. 2. It includes a pair of cylinders **64** which are parallel and coextensive, and disposed horizontally at right angles to shaft **52**. They are each pivoted at **66** to brackets **68** fixed to bed **4**. Each of said cylinders is provided with a piston **70** and a piston rod **72**. The extended ends of said piston rods are affixed respectively to the oppositely extended ends **74** of a U-shaped member **76** which rests slidably on bed **4** between cylinders **64**. A third cylinder **78** is pivoted at **80** to the central portion of member **76**, and is parallel to and longitudinally coextensive with cylinders **64**. Cylinder **78** is provided with a piston **82** and piston rod **84**, the outer end of said piston rod being fixed to a head **86** journalled on shaft **52** at the midpoint thereof. Each of cylinders **64** and **78** are provided with a hose connection **88** through which fluid under pressure from any suitable source, not shown, may be supplied to said cylinders.

The operation of the lift is believed apparent from the foregoing description. The arrangement of cylinders **64** and **78** effects a valuable economy in space requirements, since the effective travel of head **86** is thereby rendered approximately double the length of the longitudinal space required for the cylinders. This economy is particularly important where the lift is to be mounted on a truck bed or in other spaces of limited size, since it permits the

use of a platform and lifting linkage of maximum horizontal area.

While I have shown and described a specific embodiment of my invention, it will be apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A hydraulic lift comprising a planar bed adapted to be supported by a mobile vehicle, a vertically extensible linkage secured at its lower end to said bed, said linkage including a member operable by linear movement to extend said linkage, a planar platform secured to the upper end of said linkage, and hydraulic means carried by said bed and operable to extend said linkage, said linkage being retractable by gravity, said hydraulic means comprising a first hydraulic cylinder parallel to the direction of movement of said linkage member, said cylinder being fitted with a piston and a piston rod connected to said linkage member, a second hydraulic cylinder parallel to and normally longitudinally coextensive with said first cylinder, said second cylinder being attached to said bed and fitted with a piston and piston rod, and a rigid member attached to said first cylinder and to the piston rod of said second cylinder.



2. A hydraulic lift comprising a planar bed adapted to be supported by a mobile vehicle, a vertically extensible linkage secured at its lower end to said bed, said linkage including a member operable by linear movement to extend said linkage, a planar platform secured to the upper end of said linkage, and hydraulic means carried by said bed and operable to extend said linkage, said linkage being retractable by gravity, said hydraulic means comprising a first hydraulic cylinder parallel to the direction of movement of said linkage member, said cylinder being fitted with a piston and a piston rod connected to said linkage member, a pair of second hydraulic cylinders parallel to, normally longitudinally coextensive with, and disposed respectively at opposite sides of said first cylinder, said second cylinders being attached to said bed and each fitted with a piston and a piston rod, and a rigid member attached to said first cylinder and to the piston rods of both of said second cylinders.

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