United States Patent

[11] 3,582,043

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[21] Appl. No. **845,006**
[22] Filed **July 25, 1969**
[45] Patented **June 1, 1971**
[32] Priority **July 26, 1968**
[33] **Italy**
[31] **52593/68**

[54] **MOBILE LOAD LIFTER**
6 Claims, 7 Drawing Figs.

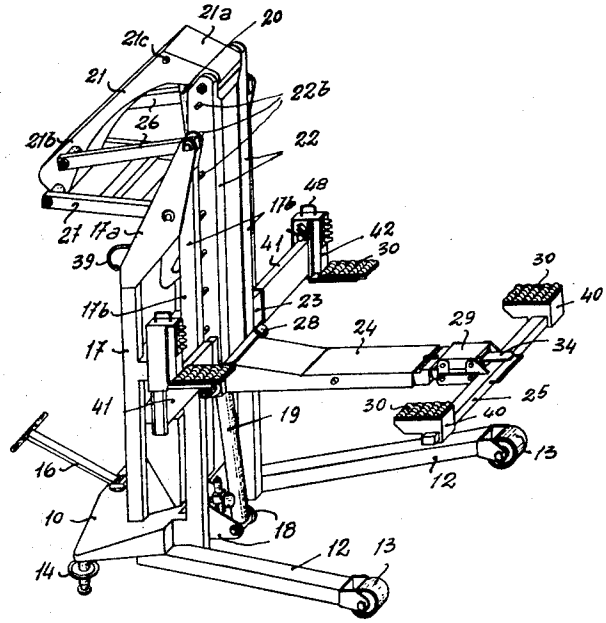
[52] **U.S. Cl.** **254/2**
[51] **Int. Cl.** **B66f 5/04**
[50] **Field of Search** ..... 254/2 R, 2 B, 2 C, 6 R, 6 B, 7 R, 7 B, 93 H, 214/Inquired; 187/Inquired

[56] **References Cited**
UNITED STATES PATENTS

2,974,490	3/1961	Hott	254/2.4
3,038,700	6/1962	Ascherl	254/2.2

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ABSTRACT: A mobile crane which may be used both as a fork trucklike device and as a vehicle-lifting machine. Special features of the crane are the pantograph means which couple two vertical frames and the double-T-shaped load support.



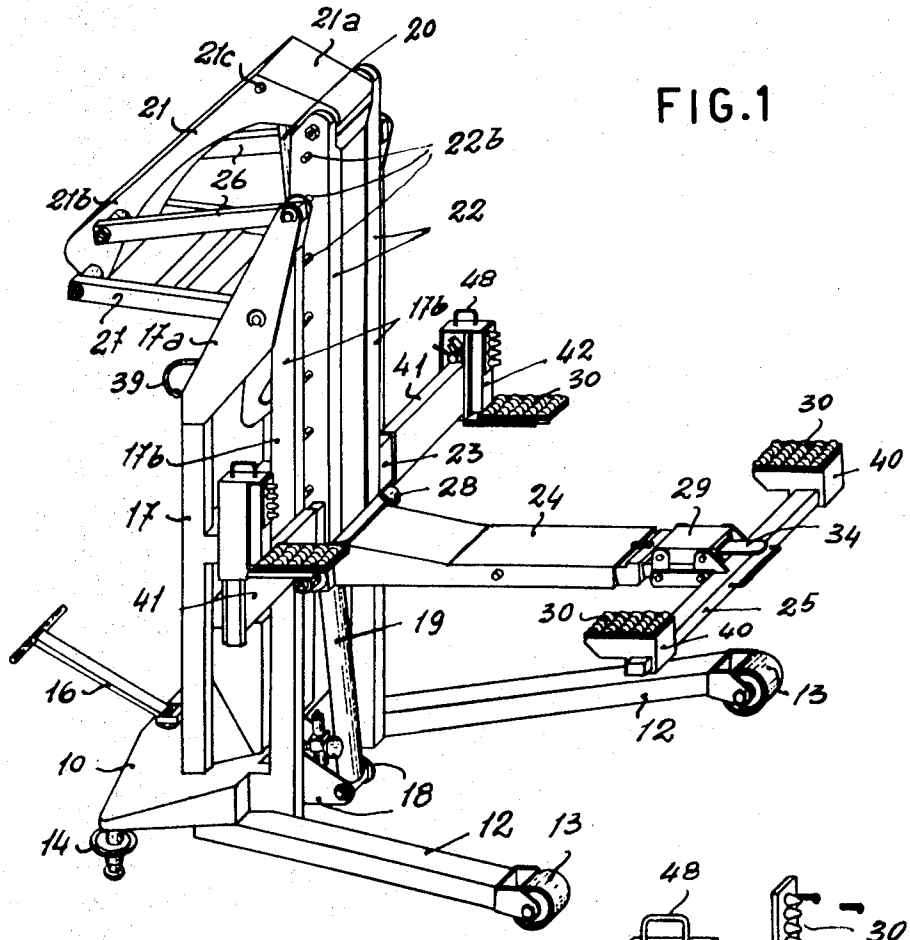


FIG. 1

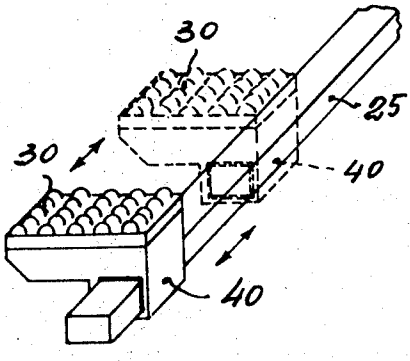


FIG. 6

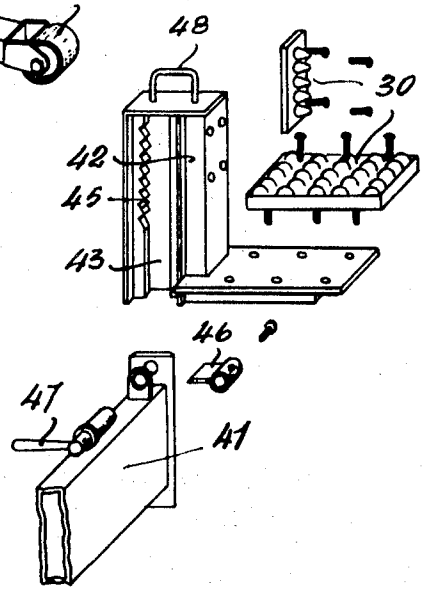


FIG. 7

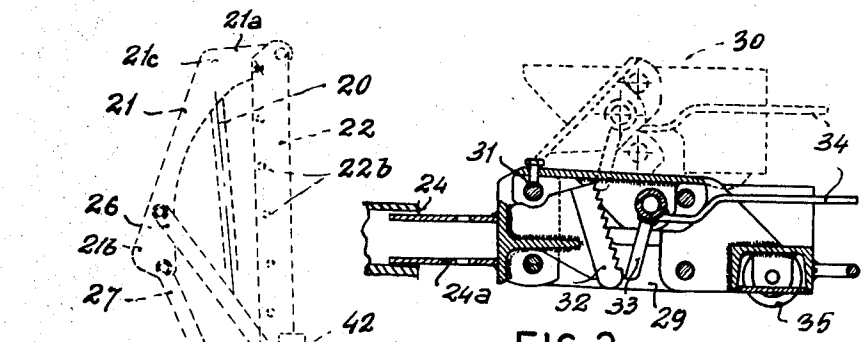


FIG.3

FIG.2

FIG.4

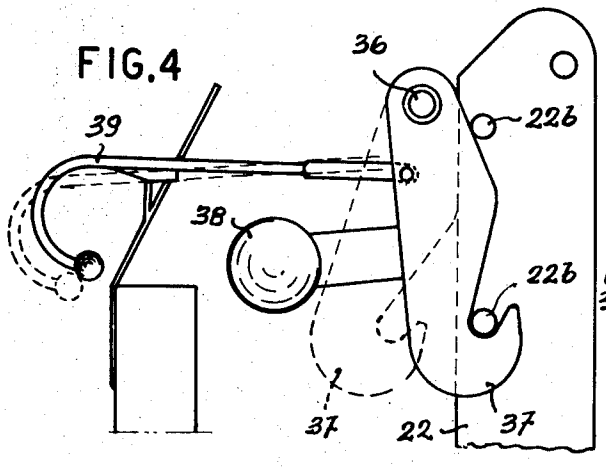
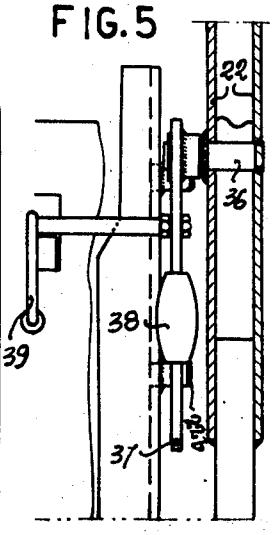


FIG.5



MOBILE LOAD LIFTER

The present invention is related to cranes of the type which may be defined as mobile, because of their particular features, which enable them to be used as both mobile cranes and, by providing a supporting base thereto, as devices to lift to moderate heights motor vehicles. In this latter role, they can raise the lower part of a vehicle into a position easily accessible to the operator which has to effect repairs or maintenance work on the vehicle.

The present invention concerns improvements relating to such lifting devices. By these improvements, the training and longitudinally adjustable arm of the crane is completely eliminated and the mobile device is rendered considerably safer, more maneuverable and possessing increased and wider performance ability, so as to permit the device to be as equivalent to those machines specifically designed for repairs and maintenance work on light and middleweight vehicles, such as pickup trucks.

Briefly stated, the lifting device of the present invention is mainly characterized by its particular structure: the substantially T-squared frame is formed by a horizontal section and a vertical section; the horizontal section provides the base support of the machine and is formed by a pair of divergent arms, telescopically adjustable in their length and terminating with suitable rollers or wheels; the vertical section is an upright column which comprises a trelliswork for the support and sliding of a carriage support an overhanging horizontal base vertically movable and shaped like a double T; this vertically movable base may be actuated, for example, hydraulically through a combination of levers which is characteristic in that the levers receive the thrust from a hydraulic piston and transmit it to the movable base of the machine.

One additional and particular feature of the improvement of the invention resides in the fact that, for any selected vertical position of the movable base with respect to the upright column, there is provided, besides the normal conventional hydraulic safety means, a rocker device capable of preventing the accidental lowering of the raised base, whether the base be loaded or not.

A further characteristic feature of the device according to the invention, resides in the terminals of the extensions of the vertically movable double-T base. These terminals or ends are adjustable in height in the vertical plane and their relative transverse spacing may be varied in the horizontal plane in order to readily locate the supporting points of the base with respect to the different sizes and configurations of the underbody or chassis of the vehicle to be lifted.

While the device according to the invention has been rather specifically improved in its use for the lifting of cars and the like, it may nevertheless be also equally advantageously utilized where it is required to lift a load to the height allowable by the raisable base.

These objects and advantages and other particular features of the invention will become apparent from the following details thereof and from the accompanying drawings, wherein:

FIG. 1 is a perspective view of the improved device of the invention, showing the raisable base lifted to one-half the total possible height;

FIG. 2 is a side view of the device of FIG. 1;

FIG. 3 is a central, vertical and detailed cross-sectional view of the device for adjusting the height of the double-T base;

FIGS. 4 and 5 are respectively side and back views of details of the safety means of the device; and

FIGS. 6 and 7 illustrate in detailed perspective view device members related to the adjustable support element of the movable base.

With reference now to FIGS. 1 and 2 of the drawings, the support frame of the device of the invention, comprises a rugged base 10 integrally connected to a pair of divergent arms 12 telescopically adjustable in their length and terminating with relatively small rollers or wheels 13. Base 10 is provided with vertically adjustable legs or pegs 14 which permit correction of the verticality of the upright column when the

device is in operation and to neutralize or counterbalance the pivotable caster wheel 15 which latter may be controlled by means of a steering arm 16. Symmetrical brackets 18, between which the lower end of a hydraulic cylinder 19 is pivotably positioned, are integrally connected to base 10. A piston, provided with stem 20 the free end of which pivots at 21*c* with respect to arm 21, acts within the cylinder 19. Arm 21 is provided with end 21*a* pivotable on a pair of front slides 22 so as to form a rugged vertically movable structure, and is firmly connected to three overhanging arms 23 and 24. The two arms 23 lie on the same vertical plane and are horizontally aligned with arm 24 which is positioned at 90° with respect to the said first two arms. Arm 24 forms the central section of a double-T lifting base (41-24-25) completed by the crossmember 25 which is adjustable both in height and length, as it will be later described.

End 21*b* of the upper arm 21 is pivotable with respect to a pair of symmetrical levers 26 and also to the ends of rigid frame 27. The opposed terminals of levers 26 and frame 27 are pivotably connected to the upper end 17*a* of the upright column 17. As it is shown in FIGS. 1 and 2, the upright column 17 consists of four parallel metal uprights; slides 22 are integrally coupled with one another and may move vertically between the front pair of uprights 17*b*. A pair of symmetrical sliding rollers 28 is carried on pins that are integral with the junction between slides 22 and horizontal arm 24. The cylindrical surface of said rollers 28 abuts the front surface of uprights 17*a*.

Leaving for the moment the description of the other details of the device it is important to understand now the operation of the device of the invention:

Cylinder 19 is pressurized with a fluid, suitably oil, by means of an electrically or manually operated pump. Starting from the position indicated in solid lines in FIG. 2, the stem 20 of the hydraulic piston acts with an upward, nearly vertical thrust. The upper end of the stem is pivotally attached at 21*c* to arm 21 which, due to its articulations on frame 27 and to the location of levers 26, follows a pantographic movement carrying in a vertical lift the sliding frame 22 and the lifting arm or base 24. FIG. 1 represents instead one of the intermediate vertical positions which can be assumed by the lifting arm or base 24, while FIG. 2 represents in dotted lines the extreme lifting position of same base, such extreme position, obviously depending on the length of the cylinder 19 and corresponding stem 20, as well as on the height of uprights 17*b* and hence on the proportional ratios of levers 21, 26 and 27.

As represented in full detail in FIG. 3, the lifting arm or base 24 is hollow and, consequently, arm 24*a* which terminates with a bracket as shown at 29 in FIG. 2, is longitudinally and telescopically adjustable within said lifting arm or base 24. Bracket 29, the upper surface of which is covered by an element made of, for instance, hard rubber or like material with nonskid properties, comprises an articulation mechanism, which may pivot about horizontal pin 31 and may be locked into position at any desired height between preestablished limits by means of a ratchet 32 and pawl 33 which is maneuverable through lever 34. Wheel 35 has the function of facilitating the operation of the device when its base is fully lowered as represented in FIG. 2 by full lines.

Reference now to FIGS. 1, 4 and 5, as already mentioned, the device, besides conventional hydraulic safety means for locking the discharge valve of cylinder 19 in case of accidental lowering of base 24, is also provided with a mechanical safety system with automatic engagement for locking the lifting base 24 at any elevation. This system comprises a device represented in detail in FIGS. 4 and 5 and, as assembled, in FIGS. 1 and 2. As shown in these figures, a hook 37 is pendularly pivotable at 36 on inclined ends 17*a* of the vertical upright 17, 17*b* and is provided with a counterweight 38 which tends to maintain it in the position indicated by full lines in FIG. 4. Hook 37 is further provided with a control handle 39. As represented in FIGS. 1 and 2, the vertically movable frame 22 is provided with a plurality of transverse pins 22*b* protrud-

ing from both sides thereof. These pins are aligned in the direction of ascension of frame **22** and strike against hook **37** which may be either a single hook on one side only of the frame **22** or a double hook, one on each side. In these conditions, the gradual rising of frame **22** and, therefore, of loaded base **24**, is assured against any accidental retro motion because the hook or hooks **37** while preventing pins **22***b* from engaging during the upward movement, prevent the sudden descent of the base by lock the pins as indicated in FIG. **4**. Thus, at worst, the maximum distance the base can travel accidentally, is limited to the distance between the centers of any two adjacent pins **22***b*.

Referring now to FIG. **6**, brackets **40** are slidingly mounted along crossmember **25**, while brackets **42** are similarly slidingly mounted on arms **23** forming the head of the double-T base by means of sleeves **41**. Brackets **42**, as represented in detail in FIG. **7** comprise a square stirrup which includes element **43** fixed with respect to correspondent sleeve **41** and a movable element **44** provided with a rack **45** which cooperates with a pawl **46**, the latest being controlled by means of a latch **47**. Latch **47** causes the rotation of pawl **46** and engages rack **45** at the desired height with respect to the fixed element **43**. The control handle **48** allows the manual displacements of bracket **42** which is covered with rubber or similar nonskid material surface **30**.

The device of the invention may be substantially designed to satisfy a plurality of uses besides the specific lifting of cars and trucks for the purpose of repairs and maintenance work. The wide range of adjustments possible in the transverse and vertical sense of the supporting brackets **40**, **42**, the adjustable elevation of the lifting base **24** and the adjustable elevation of the transverse arm **25**, all provide variations in the versatility of the device. Furthermore, the mechanical safety provided by hooks **37**, which may be manually released and which operate automatically, makes the device extremely safe against any accidental fall of base **24**.

It is understood that the device according to the invention is in no way limited by the embodiments specifically illustrated and that, without departing from the scope of the invention, modifications dictated by practical requirements may be readily carried into effect.

What I claim is:

1. A mobile crane comprising:

a. a first, substantially vertical frame including a plurality of fixed upright members and a base portion;

b. a second, substantially vertical frame positioned adjacent and movable with respect to said first frame;

c. pantograph means coupling said second frame to said first frame;

d. a substantially double-T-shaped load support member secured squarely, in a substantially horizontal plane, to said second frame;

e. means for lifting said load support member along a substantially vertical path whereby said load support member remains in a substantially horizontal plane; and

f. safety means for permitting unintentional lowering of said load support member only in a stepwise manner and only through a relatively small, predetermined distance.

2. The mobile crane in accordance with claim **1**, wherein said safety means comprises a plurality of vertically spaced pins extending laterally from said second frame and at least one hook member loosely and pivotably mounted on said first frame, said hook member being contacted and angularly displaced by said pins during upward movement of said second frame, said hook member being arranged to engage one of said pins during unintentional downward movement of said second frame whereby said frame is permitted downward movement no greater than the spacing between two adjacent ones of said pins.

3. The mobile crane in accordance with claim **1**, including the combination of means for adjusting the width dimension of the opposed, parallel sections of said double-T-shaped load support member and means for adjusting the height of at least one of the opposed, parallel sections of said double-T-shaped load support member.

4. The mobile crane in accordance with claim **3**, wherein said one of said opposed, parallel sections of said double-T-shaped load support member is pivotally connected to the perpendicular connecting section thereof and said height adjusting means comprises pawl and ratch means for stepwise actuation of said one parallel section in the vertical direction.

5. The mobile crane in accordance with claim **3**, wherein said width adjustment means comprises telescoping members on said opposed, parallel sections of said double-T-shaped load support member.

6. The mobile crane in accordance with claim **1**, wherein said lifting means for said load support member is hydraulic.