Nov. 21, 1944. C. P. BAUM 2,362,981

AIRPLANE LIFT DOLLY

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Fig. 1.

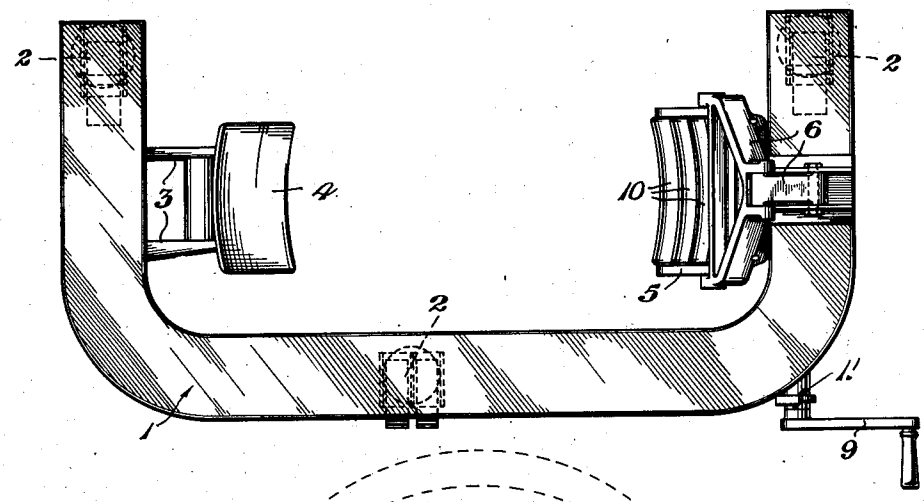


Fig. 2.

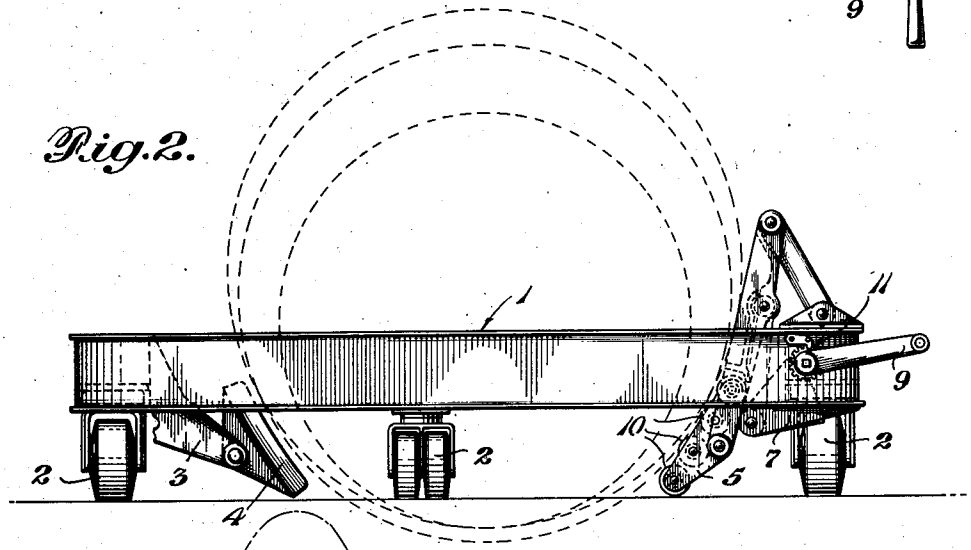


Fig. 3.

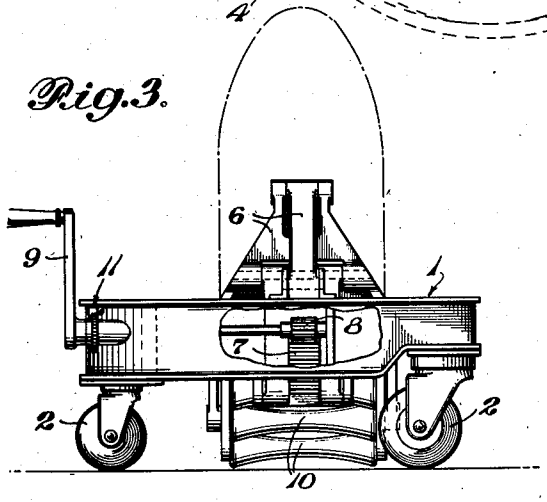
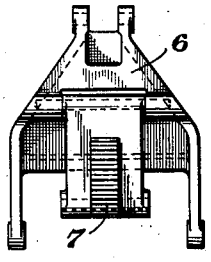


Fig. 4.



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Fig. 5.

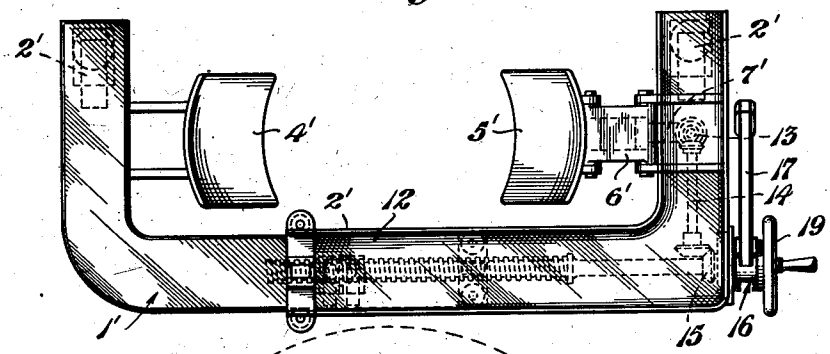
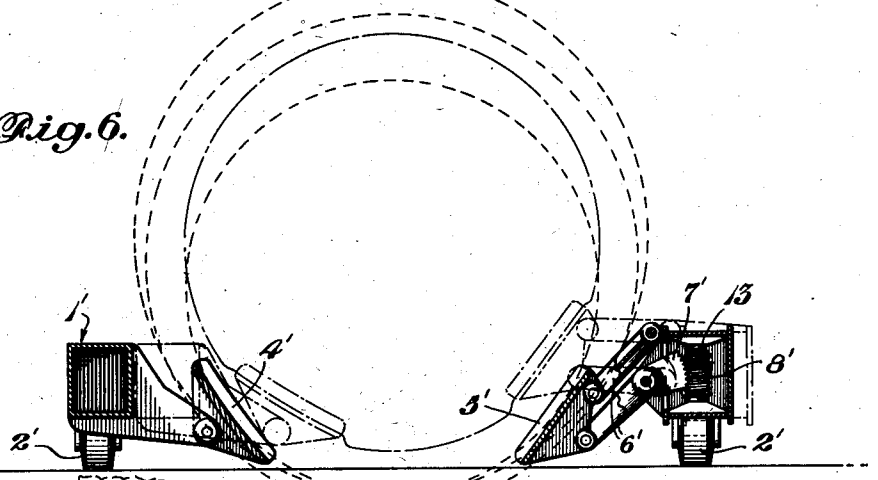


Fig. 6.



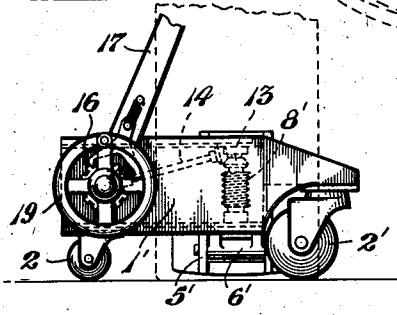


Fig. 8.

Fig. 7.

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Fig. 9.

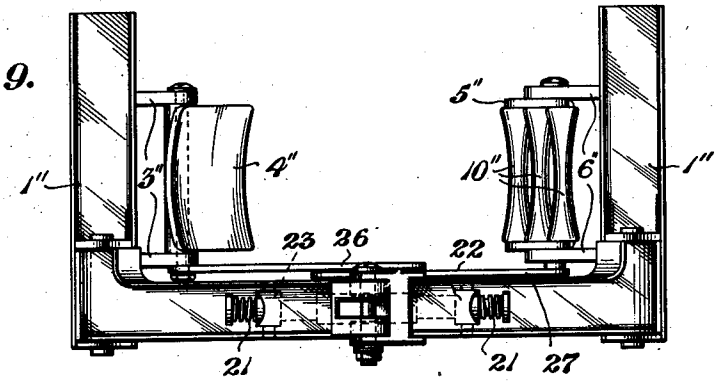
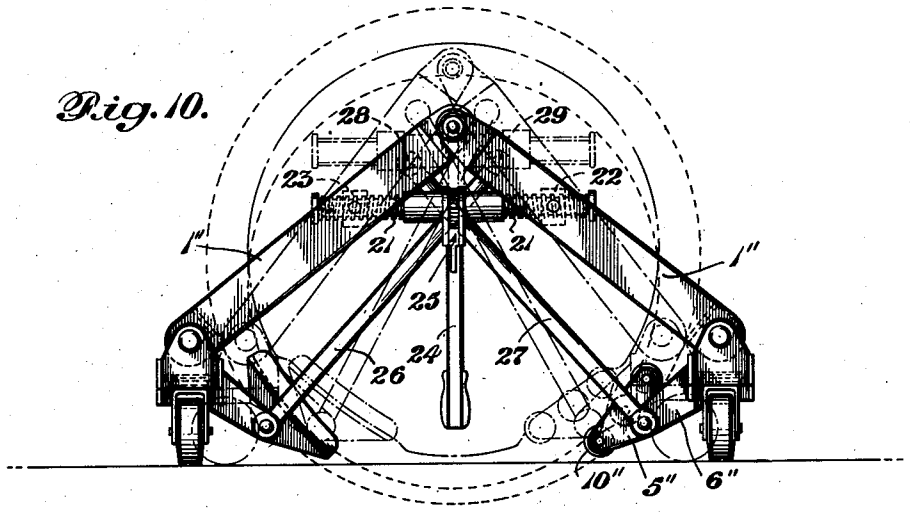


Fig. 10.



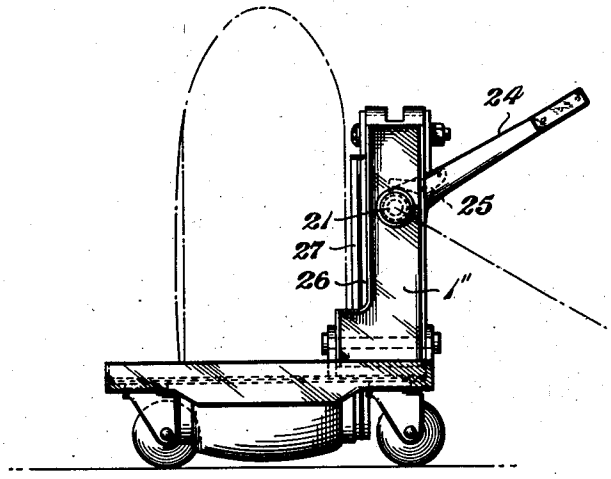


Fig. 11.

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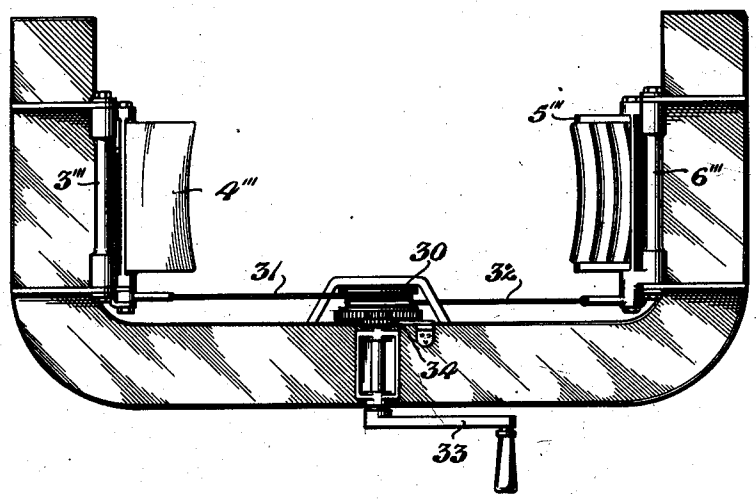
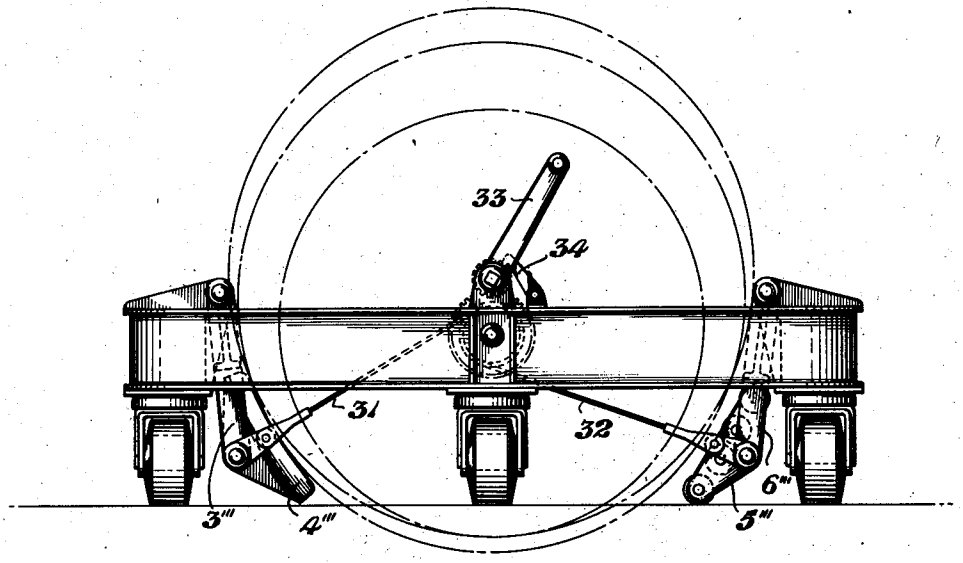


Fig. 12.

Fig. 13.



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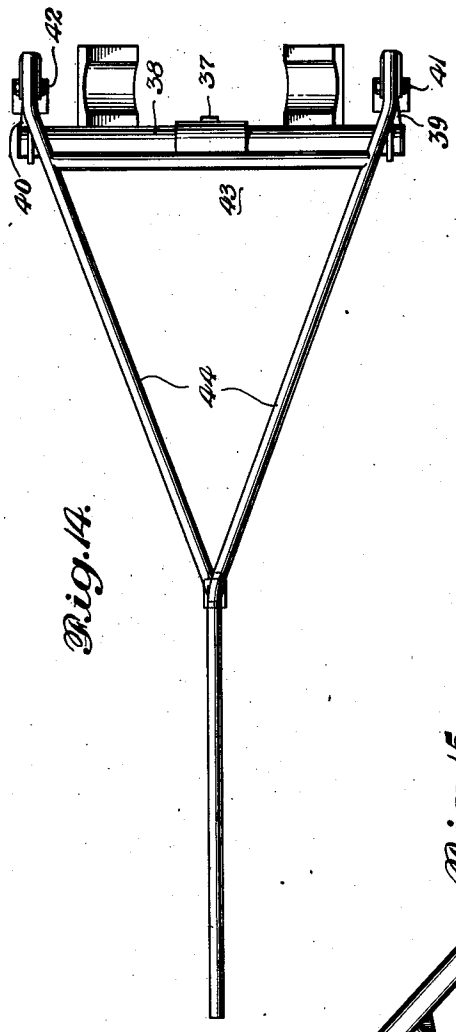


Fig. 14.

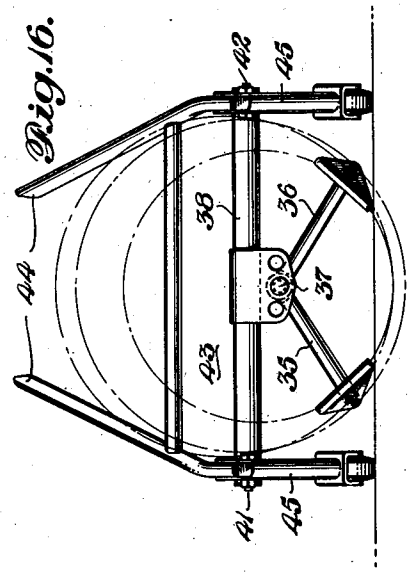


Fig. 16.

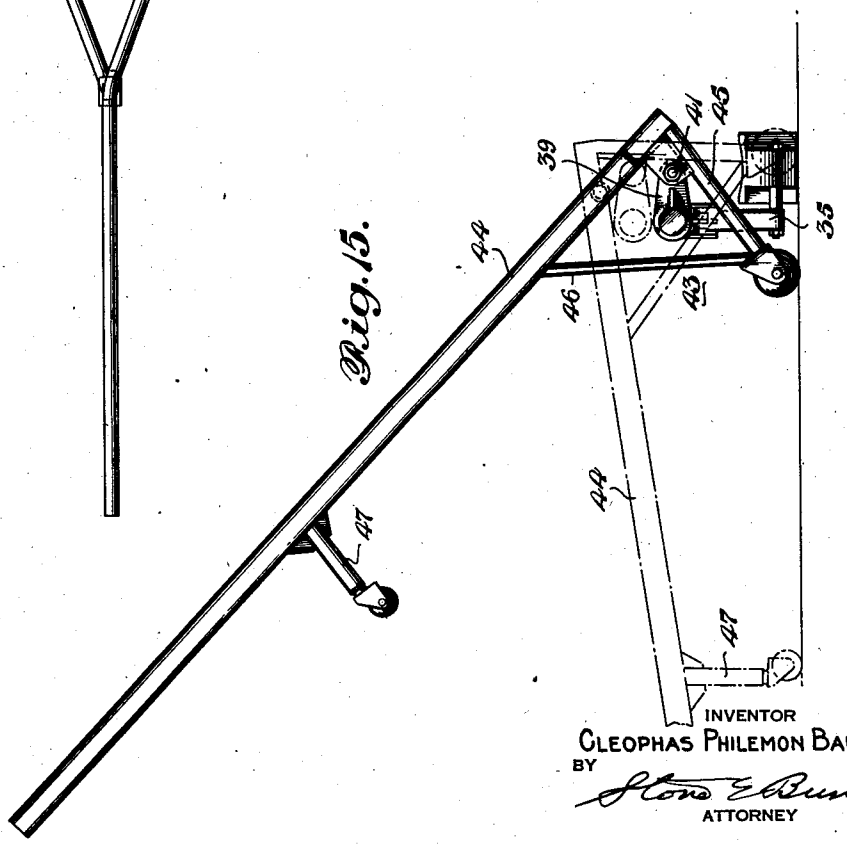


Fig. 15.

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UNITED STATES PATENT OFFICE

2,362,981

AIRPLANE LIFT DOLLY

Cleophas Philemon Baum, Westgate, Md.

Application June 1, 1943, Serial No. 489,267

6 Claims. (Cl. 214—65.4)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757).

The subject of this invention is the construction of a suitable spotting dolly for use on aircraft carriers and in close quarters on landing fields and in hangars, for moving airplanes around, and into and out of compact parking arrangements. Some of the essential requirements of such dolly are that it may be operated by one man, that it will lift an airplane wheel substantially vertically without affecting the airplane otherwise, that it will be movable in any horizontal direction, and that it will be quickly releasable without causing lateral or longitudinal movement of the airplane.

The object of the subject device is to provide a dolly that will meet the above requirements and will be simple and compact in construction yet sufficiently rugged to withstand rough handling.

A further object is to construct a dolly which is adapted to embrace and quickly raise one wheel, but will engage only the tire and will not contact any other part of the airplane, such as the hub, axle, etc., and will not require any special fittings added to the airplane for lifting purposes.

A further object is to build a dolly so that it may be applied from the outboard side of either of the two conventional non-swivelling main wheels of an airplane without endangering the operator by a moving propeller or obliging him to crawl under the lower wing of a conventional biplane.

Further and more specific objects will become apparent as the description of the subject devices proceeds. Several illustrative forms of these devices are shown in the accompanying drawings in which,

Fig. 1 is a plan view of one preferred form of construction having a rigid C frame for a base mounted on casters;

Fig. 2 is an elevation thereof;

Fig. 3 is an end view of this form;

Fig. 4 is a detail of a portion of the operating lever mechanism of the above-mentioned form;

Fig. 5 is a plan view of another form in which the basic frame is made in two parts telescopically fitted together for adjustment to different-sized tires;

Fig. 6 is an elevational view showing the relation of the shoe plates applied to the periphery of the tire in its lowered (full line) and raised (broken line) positions in the above form;

Fig. 7 is an elevation of this form;

Fig. 8 is an end view thereof;

Fig. 9 is a plan of a third form of the device;

Fig. 10 is an elevation thereof;

Fig. 11 is an end view of this form;

Fig. 12 is a plan view of a fourth form of the device;

Fig. 13 is an elevation thereof;

Fig. 14 is a plan view of a fifth form;

Fig. 15 is an end view thereof, and

Fig. 16 is an elevation of this form.

Similar numerals are used to designate corresponding parts in the several forms and views of the drawings.

Any one of the devices herein disclosed has means for applying a pair of shoes to the underside of a tire on an airplane, one shoe in front of the point of tire contact with the ground and the other in back of it, then lifting the tire off the ground by moving one or both shoes.

In the first form of the device (Figs. 1 to 4), the C frame 1 is mounted on casters 2 which are swivelled to turn in any direction in response to movement of the device in that direction. A bracket 3 extends inwardly from one of the open ends of the C frame and has a shoe 4 hinged to it close to the ground so as to fit under a tire adjacent its point of contact with the ground when the device is rolled into position preparatory to lifting the wheel. The other open end of the C frame has an adjustable shoe 5 mounted on it. This shoe fits under the tire at the other side of the ground contact, and is adapted to move inwardly and slightly upwardly in a scooping motion by means of a lever system 6 operated by a gear sector 7 and pinion 8 through the hand crank 9. The shoe 5 is equipped with rollers 10 to avoid sliding friction between the shoe and tire as the latter is scooped up onto the stationary shoe 4. The leverage 6 is so arranged that shoe 5 may be swung sufficiently to take care of all sizes of conventional airplane tires such as, e. g., 26'' x 6'' up to 32'' x 6'', including the streamline types.

The crank 9 has a pawl and ratchet pinion 11 for locking the leverage in place. By releasing this pawl and ratchet the wheel may be lowered instantly. The shoes 4 and 5 are curved to prevent sliding of the tire sideways and letting it slip off the shoes.

In the second form of the device the C member 1' is made of two parts telescopically connected at 12 for the purpose of adjusting the device to different-sized tires. Thus only a comparatively small leverage mechanism 6' is necessary to accommodate all the conventional sizes of tires. The leverage mechanisms 6' is of the parallelogram type, one of the parallel levers having a gear sector 7'' operated by the worm 8' through bev-

elled gear mechanism 13—14—15, the gear 15 being operated through a pawl and ratchet arrangement 16 by a lever 17. A shaft 18 having an operating hand wheel 19 extends through the collar on which gear 15 is mounted and has a threaded member 20 which operates the telescopic connection to increase or decrease the distance between the shoes 4' and 5'. In this form the shoe 5' may be of the plane surface type since the amount of sliding friction in this construction during the raising or lowering operation is negligible. In either of the forms, the shoe 4, or 4', may be rigidly mounted on its bracket, instead of being hinged as shown in the drawings. The form shown in Figs. 5 to 8 has casters 2' which are swivelled to turn in any direction, just as in the first form.

In using this form of device it is first rolled into position around a wheel, the handwheel 19 being turned for adjusting the distance between shoes to fit the tire, and then the lever 17 is rocked back and forth to operate the threaded member 20 and the leverage mechanism through the double pawl and ratchet arrangement 16, which simultaneously actuates the telescopic connection to bring the shoes closer together, thereby lifting the tire. When the tire clears the ground by approximately one inch, it is ready to be moved in any desired direction.

In the third form, the C member is composed of a pair of hinged L members 1'', the joined ends of which are upwardly inclined and hinged together at the top. A threaded member 21, having right and left-hand threads at its opposite ends, is threaded into correspondingly threaded nuts 22 and 23 swivelled to the inclined portions of the L members, and is turned by means of the operating handle 24 through a pawl and ratchet arrangement 25. The shoes 4'' and 5'' are mounted on the ends of hinged brackets 3'' and 6'', which are pivotally connected to links 26 and 27, the other ends of which are pivotally mounted on the L members 1'' at 28 and 29 respectively. The shoe 5'' may be provided with rollers 10'' similarly shaped to those shown in the first form.

The operation of this form is similar to that of either of the other forms in that the device is first rolled into place around the wheel with the shoes in their lowermost positions and then by operating lever 24 the tire may be raised to a suitable level for moving in any direction desired.

In the fourth form of my device the base is of the rigid C form and has a pulley arrangement 30 mounted at the middle of its side portion. The pulley is provided with lines 31 and 32 running therefrom to the two shoes 4''' and 5''' which are mounted on hinged brackets 3''' and 6''' respectively on the open ends of the C base. The pulley is operated through a gear reduction means by hand crank 33 which has a pawl and ratchet mechanism 34 for locking it in place. This form is equipped with casters that are swivelled to turn in any direction just as the other forms described above.

In the fifth form of my device the shoes are pivotally mounted on swingable arms 35 and 36 respectively which are hung on a common pivot 37 mounted on a bar 38 which is hinged at its ends by means of arms 39 and 40 to pivots 41 and 42 on a lever arrangement 43. This lever arrangement consists of a long lever arm 44 extending from these hinges in a V shape to form a common handle. Upright portions 45 are joined to the hinge ends of this arm at a right angle thereto and are braced by angular braces 46 to the sides of the V. At the lower end of the upright portions 45 are mounted casters swivelled to turn in any direction, similar to those used in the other forms of device. Another upright member 47 somewhat shorter than the other two is mounted at right angles on this arm near the apex of the V and is also equipped with a swivelled caster at its end. Thus in using this form of device it may be rolled into position with the shoes under the tire and the lever arm 44 lifted. Then by pulling the lever down the shoes will grip the tire and lift it until the arm reaches a horizontal position, whereafter it will be slightly lowered until the caster on the short upright member 46 reaches the ground. The mechanism is stabilized in this position because the casters on the long upright members will have reached a position on the opposite side of the vertical plane passed through the hinges 41 and 42 thus providing a moment at these hinges about the latter casters in the direction of the third caster due to the weight of the wheel, etc., acting on the hinges. The arms 35, 36 should be not longer than the radius of the smallest wheel to be raised, so as to avoid the possibility of slipping of the shoes circumferentially off the wheel.

In the construction of these devices the leverage system should be so designed that if the raising means is actuated by a short ratchet lever, requiring more than two strokes, or a hand crank, the maximum allowable effort applied at the end of the lever or crank shall be approximately 50 pounds. A lesser amount is desirable. If a long lever requiring two strokes or less is used, and where the operator's weight may be used to advantage, then the effort required may be increased to not over 100 pounds.

It is obvious that various modifications in form, dimensions and arrangement may be made without departing from the scope of this invention as defined by the appended claims.

This invention may be used by or for the Government of the United States for governmental purposes without the payment to me of any royalties thereon or therefor.

What is claimed is:

1. A lifting dolly composed of two opposed L members each having a horizontal shaft for one side of the L and arms inclined upwardly toward each other for the other side, the arms being hinged together at their upper ends, a bracket hinged on each of said shafts, said brackets being inclined downwardly toward each other and having swivelled castors near their ends, a shoe mounted on the lower end of each bracket adapted to slide under a wheel to be lifted, a link for pivotally connecting the lower end of each bracket to a point near the top of the inclined arm of the opposite L member so that as these arms are drawn toward each other the brackets will approach each other without modifying their angular relation, and self-locking means for manually drawing said arms together or increasing the angle between them.

2. A lifting dolly composed of two opposed L members each having a horizontal shaft for one side of the L and arms inclined upwardly toward each other for the other side, the arms being hinged together at their upper ends, a bracket hinged on each of said shafts, said brackets being inclined downwardly toward each other and having swivelled casters near their ends, a shoe

mounted on the lower end of each bracket adapted to slide under a wheel to be lifted, a link for pivotally connecting the lower end of each bracket to a point near the top of the inclined arm of the opposite L member so that as these arms are drawn toward each other the brackets will approach each other without modifying their angular relation, and self-locking means for manually drawing said arms together or increasing the angle between them, said means consisting of a horizontal shaft having right and left-hand threaded portions at its ends working in correspondingly threaded nuts pivotally mounted on the inclined arms of the L members, and an operating lever hung over the center of said shaft for turning it in either direction through a reversible pawl and ratchet connection.

3. A lifting dolly composed of two opposed L members each having a horizontal shaft for one side of the L and arms inclined upwardly toward each other for the other side, the arms being hinged together at their upper ends, a bracket hinged on each of said shafts, said brackets being inclined downwardly toward each other and having swivelled casters near their ends, a shoe mounted on the lower end of each bracket adapted to slide under a wheel to be lifted, a link for pivotally connecting the lower end of each bracket to a point near the top of the inclined arm of the opposite L member so that as these arms are drawn toward each other the brackets will approach each other without modifying their angular relation, and self-locking means for manually drawing said arms together or increasing the angle between them, said means consisting of a horizontal shaft having right and left-hand threaded portions at its ends working in correspondingly threaded nuts pivotally mounted on the inclined arms of the L members, and an operating lever hung over the center of said shaft for turning it in either direction through a reversible pawl and ratchet connection, said shoes being grooved to prevent the wheel from slipping off while it is being moved about on the dolly.

4. A lifting dolly composed of two opposed L members each having a horizontal shaft for one side of the L and arms inclined upwardly toward each other for the other side, the arms being hinged together at their upper ends, a bracket hinged on each of said shafts, said brackets being inclined downwardly toward each other and having swivelled casters near their ends, a shoe mounted on the lower end of each bracket adapted to slide under a wheel to be lifted, a link for pivotally connecting the lower end of each bracket to a point near the top of the inclined arm of the opposite L member so that as these arms are drawn toward each other the brackets will approach each other without modifying their angular relation, and self-locking means for manually drawing said arms together or increasing the angle between them, said means consisting of a horizontal shaft having right and left-hand threaded portions at its ends working in correspondingly threaded nuts pivotally mounted on the inclined arms of the L members, and an operating lever hung over the center of said shaft for turning it in either direction through a reversible pawl and ratchet connection, said shoes being grooved to prevent the wheel from slipping off while it is being moved about on the dolly, at least one of said grooves being provided with groove shaped rollers for rolling contact with the wheel to eliminate sliding friction between the shoes and wheel as the shoes are moved relative to each other during raising or lowering operation.

5. A lifting dolly composed of a C frame formed of telescoping portions to adjust the distance between the open ends of the C, swivelled casters for said frame, a shoe mounted on a bracket inside one of said open ends, another shoe mounted inside the other of said open ends on a parallel lever system for translating said other shoe in an arcuate path for raising a wheel about which said dolly is positioned by pushing it over onto the other shoe, or conversely, for lowering it to the ground, and self-locking means for manually operating said lever system.

6. A lifting dolly composed of a C frame formed of telescoping portions to adjust the distance between the open ends of the C, swivelled casters for said frame, a shoe mounted on a bracket inside one of said open ends, another shoe mounted inside the other of said open ends on a parallel lever system for translating said other shoe in an arcuate path for raising a wheel about which said dolly is positioned by pushing it over onto the other shoe, or conversely, for lowering it to the ground, and self-locking means for simultaneously operating said lever system and telescopically adjusting the portions of said C frame to raise or lower said wheel.

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