Feb. 12, 1935. L. J. H. MARTIN 1,991,255

ELEVATOR FOR ANY APPLICATIONS

Filed Feb. 21, 1933 3 Sheets-Sheet 1

Fig. 1.

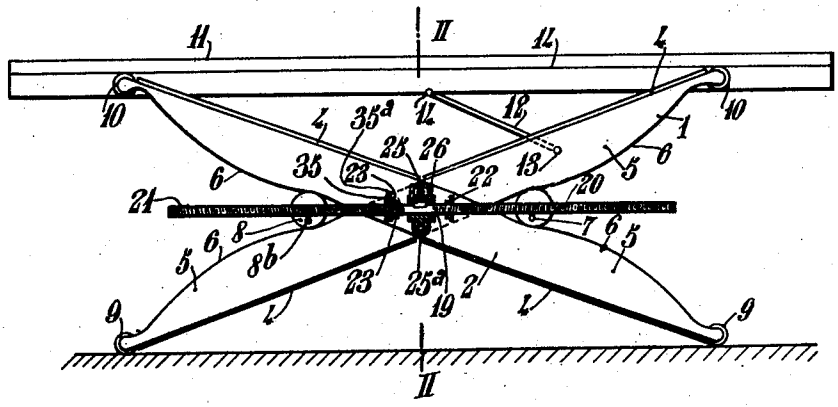
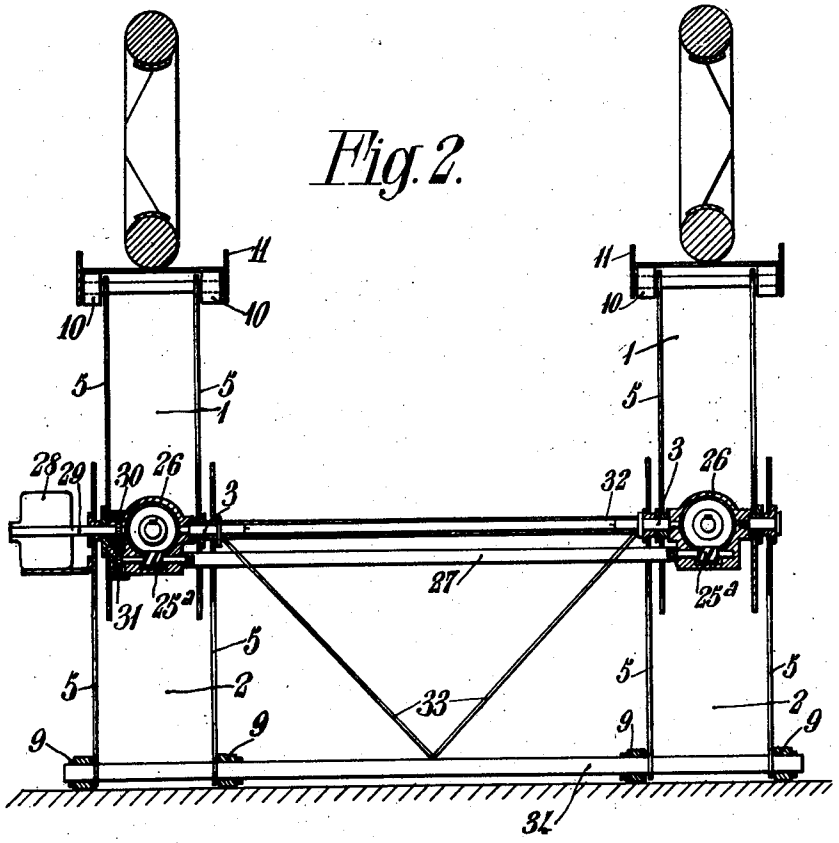


Fig. 2.



L. J. H. Martin
INVENTOR

By: Marks & Clerk
Attys.

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Filed Feb. 21, 1933 3 Sheets-Sheet 2

Fig. 8.

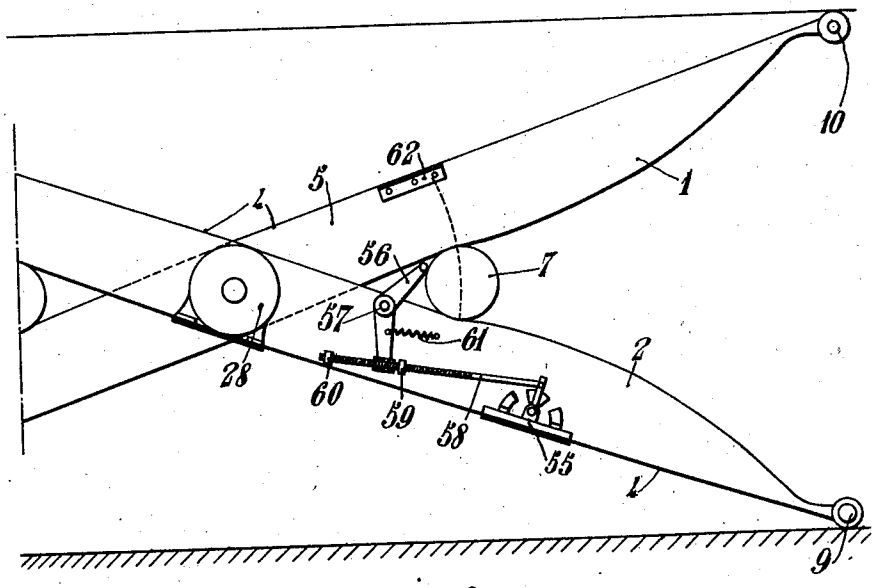


Fig. 9.

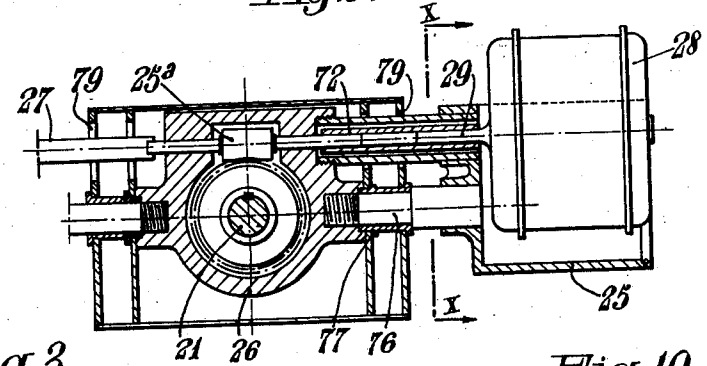


Fig. 3.

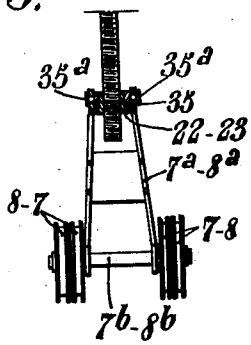
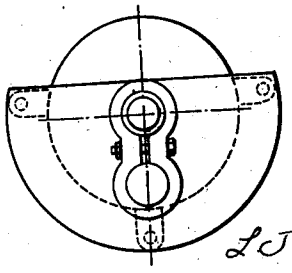


Fig. 10.



L. J. H. Martin
INVENTOR

By: Marks & Clerk
Attys.

Feb. 12, 1935. L. J. H. MARTIN 1,991,255

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Filed Feb. 21, 1933 3 Sheets-Sheet 3

Fig. 4.

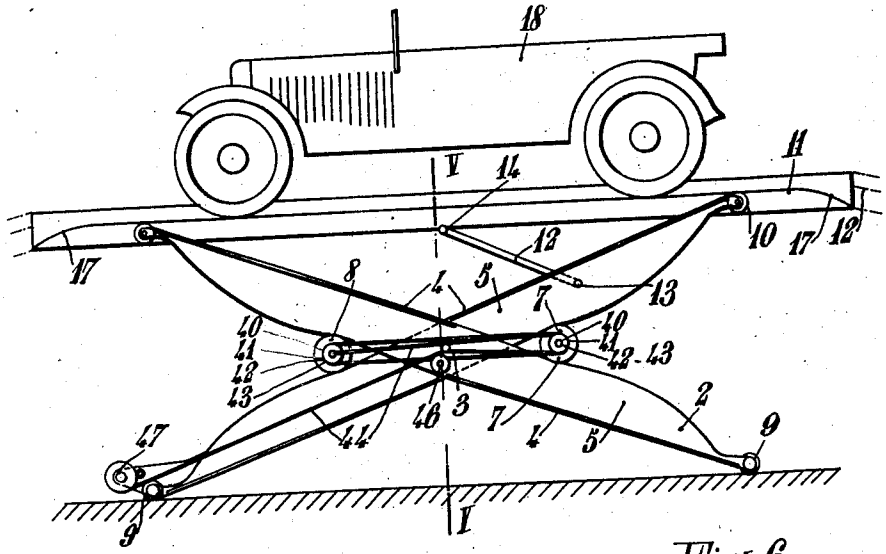


Fig. 5.

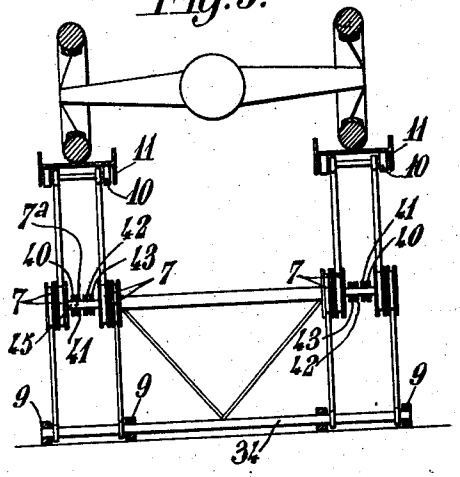


Fig. 6.

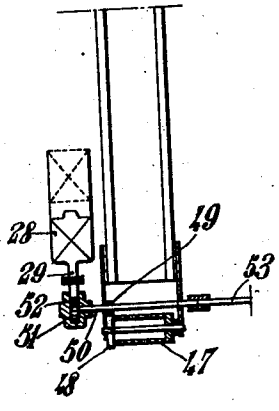
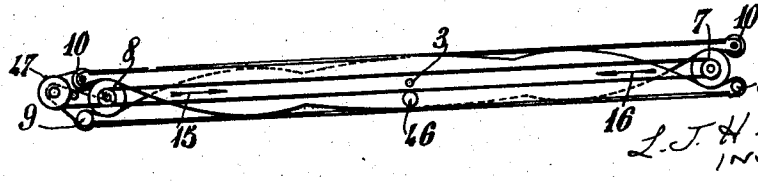


Fig. 7.



L. J. H. Martin.
INVENTOR

By: Marks & Clark
Attys.

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UNITED STATES PATENT OFFICE

1,991,255

ELEVATOR FOR ANY APPLICATIONS

Louis Joseph Henri Martin,
Neuilly-sur-Seine, France

Application February 21, 1933, Serial No. 657,899
In France February 29, 1932

8 Claims. (Cl. 254—126)

This invention has for its object an apparatus for lifting loads by angularly spacing apart two crossed arms each resting on the ground at one end.

In known apparatus of this type; use is generally made of screw jacks acting on the ends of the crossed arms, so that it is necessary to cause these arms to pivot about a common shaft, this shaft receiving, during lifting, important stresses.

Screw jacks are also known, which are constituted, generally speaking, by two arms pivoted at one end about a common shaft, a thrust member acting between these arms in order to space them apart.

The present apparatus, of the general type indicated in the first paragraph, is characterized by the fact that the spacing apart of the crossed arms is determined by the movement of two thrust members towards each other, these thrust members being arranged in the opposite angles having a horizontal bisector.

This arrangement procures a quite surprising technical effect which resides in the possibility of eliminating the pivot shaft of the crossed arms; this shaft, in case it is provided, is used only as a guide member, but is not subjected to any stress.

This invention also relates to various forms of construction which will appear from the following description with reference to the accompanying drawings, given by way of example only and in which:

Fig. 1 is an elevation of a first form of construction (raised position).

Fig. 2 is a section made according to line II—II of Fig. 1.

Fig. 3 is a view of a detail of the control for the rollers.

Fig. 4 is an elevation of a second form of construction (raised position).

Fig. 5 is a section made according to line V—V of Fig. 4.

Fig. 6 is a view of a detail.

Fig. 7 is a view corresponding to Fig. 4 (lowered position, the girders acting as tracks being removed).

Fig. 8 is a partial elevation of an automatic device for controlling the circuit of the motor.

Fig. 9 is an elevation, with axial section, showing how the motor is mounted on one of the speed reducing devices.

Fig. 10 is a section made according to line X—X of Fig. 9.

The elevator, illustrated by way of example only, comprises two lateral devices each composed of two arms 1 and 2 centrally pivoted about a stub shaft 3. These arms, which can be of any suitable construction, are constituted, in the embodiments illustrated, by boxes having base plates 4 and side cheeks 5. The latter are so shaped as to constitute inclines 6 or tracks for rollers 7 and 8. The arms 1 and 2 constituting boxes, fit in each other, as illustrated. The grooved rollers 7 and 8 are connected per pair and run on the corresponding inclines 6.

The ends of the arms 1 and 2 are so constructed as to receive lower wheels 9 and upper wheels 10. The lower wheels 9 facilitate the displacement, on the one hand, of the lower ends of the arms 1 and 2 on the ground during lifting, and, on the other hand, of the entire elevator. Cross members or girders 11 rest on the upper wheels 10 and constitute tracks for the wheels of a motor car. This arrangement allows to substitute rolling stresses for the friction stresses. Links 12 pivoted, on the one hand, at 13, on one of the arms and, on the other hand, at 14, on the girders 11, allow to hold the latter in a correct mean position on the arms 1 and 2.

The operation of the elevator previously described is as follows:

The apparatus being in the lower position (Fig. 7) in which the arms 1 and 2 are fitted into each other, the displacement of the rollers 7 and 8 in the direction of the arrows 15 and 16 towards the stub shafts 3 is effected by any suitable means, some of which will be subsequently described. The displacement of the rollers 7 and 8 causes the arms 1 and 2 to be moved apart, these arms then assuming the position illustrated in Figs. 1 and 4.

During lifting, the wheels 9 move on the ground and the wheels 10 move under the girders 11. The links 12 allow of holding, as indicated, the girders 11 in a suitable mean position.

The arms 1 might also, without departing from the scope of the invention, be pivoted for instance on the girders 11 which would then rest at their other ends on wheels 10 journalled in the upper ends of the arms 2, the links 12 could then be dispensed with. Likewise, the arms 2 might be pivoted, at their lower ends, on a bed plate, the lower ends of the arms 2 then resting on this plate through the medium of the wheels 9.

The girders 11 are preferably provided, as illustrated in Fig. 4, with end inclines 17 facili-

tating the placing of a motor car 18 in position on these girders 11.

The displacement of the lifting rollers 7 and 8 can be effected in various manners, which are all included in the scope of the invention.

In the form of construction more particularly illustrated in Figs. 1, 2 and 3, each cruciform unit 1—2 is controlled by a rod 19 provided with a right-hand thread 20 and a left-hand thread 21, on which nuts 22 and 23 are engaged. The latter are connected to carriages 7*a* and 8*a* on which the pairs of rollers 7—7, 8—8 are loosely mounted, as more particularly illustrated in plan view in Fig. 3. The shaft 7*b* or 8*b*, on which the rollers 7 or 8 are mounted, is distorted at its central portion for allowing the passage of the corresponding screw-threaded rod 19. According to a feature of the invention, the rod 19 is rendered angularly rigid with a worm wheel 25, but can move in translation relatively to the latter.

The worm wheel 25, which is arranged within a gear case 26, constantly meshes with the worm 25*a*.

The lateral driving devices are synchronized. For that purpose, the worms 25 are angularly connected by a shaft 27.

The actuation of the kinematic device can be effected by hand, or by means of an electric motor 28, as illustrated. This motor 28 is preferably rigidly secured on one of the arms, so that its shaft 29 should be co-axial with the stub shaft 3 on which the arms are pivoted. The shaft 29 drives, through the medium of toothed wheels 30 and 31, the worms 25*a*.

It will also be noted that the gear cases 26 are so mounted that they can angularly move about the stub shaft 3 as more particularly indicated in Fig. 2.

Moreover, the nuts 22 and 23, as shown in Fig. 3, are mounted on the carriages 7*a* and 8*a* through the medium of boxes 35 journalled on the carriages, the nuts 22 and 23 being adjustable in position in the boxes 35 by any suitable means and being held by locking screws 35*a*.

Figs. 4, 5, 6 and 7 illustrate another form of construction in which the rollers 7 and 8 are driven by a pulley block device. For that purpose, the shafts 7*a* and 8*a* of the rollers 7 and 8 carry pulleys 40, 41, 42 and 43 (Fig. 5). A pulley block cable 44 is attached, at 5, to the shaft 7*a* for instance, it winds on the pulleys 40, 41, 42 and 43, and then passes over a pulley 46. The cable 44 then winds on a drum 47 journalled in the lower end of the arm 1 (Fig. 4). The drum 47, on which the cable 44 winds, is rendered angularly rigid with a toothed wheel 48 (Fig. 6) meshing with a pinion 49. The latter is keyed on a shaft 50 carrying a worm wheel 51 driven by a worm 52 connected to the shaft 29 of the electric motor 28.

The shaft 50 is rendered angularly rigid, by a shaft 53, with the device driving the other cruciform unit, so as to ensure the synchronism of the movements of both these units.

Fig. 8 illustrates a form of construction of a device controlling the circuit of the motor 28, in order to automatically stop the latter in the extreme positions. This device comprises an ordinary reversing contactor 55 secured on the base plate 4 of the arm 2. This reverser 55 is manually controlled between the extreme positions of the elevator for closing or opening the circuit of the motor. In the extreme lifting position, one of the rollers 7 acts at the end of the stroke, against a lever 56 journalled at 57 in the arm 2 and connected, by a link 58 provided with adjustable abutments 59 and 60, to the reverser, in order to automatically effect the opening of the circuit of the motor.

The lever 56 is subjected, in one direction, to the action of a spring 61, so that the arm 56 should always be in correct position to be moved by the roller 7.

In the extreme lower position, an abutment 62, secured on the arm 1, acts, at the end of the movement, on the lever 56 for opening the circuit of the motor.

The actuation of the rollers 7 and 8 might also be ensured by any devices other than those illustrated (chains, hydraulic jacks, etc.).

It will be noted that, according to the invention, each carriage 7*a*—8*a* (Fig. 3) can angularly move about trunnions 35*a* for diminishing the bending stresses on the actuating worm in case the gear case 26 and the nuts 22 and 23 should not be exactly placed in a straight line. Moreover, these trunnions 35*a*, instead of being directly pivoted on the carriage 7*a* or 8*a*, might be pivoted on an independent member journalled on the carriage 7*a* or 8*a* about trunnions at right angles to the trunnions 35*a*, in such a manner that each carriage should be coupled to the worm through the medium of a joint of the universal type in order to allow the carriages to be set relatively to the inclines without exerting too considerable abnormal stresses on the worm. It will also be noted that the gear case 26 can be loosely mounted about a horizontal shaft for the same purpose as previously.

Figs. 9 and 10 illustrate a modification of the arrangement of the motor 28. In this modification, the motor is rigidly mounted on the casing 26 of one of the speed reducing devices controlling one of the worms 21. The support 75, on which the motor is mounted, is connected to the casing 26 by a stub shaft 76 journalled in a ring 77 constituting a bearing and mounted in the arms at the pivot point.

The connection between the shaft 29 of the motor and the corresponding worms, is effected by means of intermediate sleeves or shafts 78 and 27. Openings 79 are also provided in the pivoted arms for allowing their angular movement relatively to the motor which remains horizontal.

What I claim as my invention and desire to secure by Letters Patent is:

1. In an apparatus for lifting loads and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, and means for moving the said thrust members in order to space the arms apart.

2. In an apparatus for lifting loads, and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart.

3. In an apparatus for lifting loads and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, two box-like arms fitting in each other for constituting the said crossed arms, a pivot shaft for the said arms, arranged in their middle portion, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground.

4. In an apparatus for lifting loads, and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground, the said means for driving the carriages being constituted by a rod screw-threaded at its ends in opposite directions, a motor actuating the said rod, and means for automatically opening, in the extreme positions, the circuit of the said motor.

5. In an apparatus for lifting loads, and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground, the said means for driving the carriages being constituted by a rod screw-threaded at its ends in opposite directions, a motor actuating the said rod, each carriage being pivoted about a horizontal shaft on a nut mounted on the screw-threaded rod.

6. In an apparatus for lifting loads, and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground, the said means for driving the carriages being constituted by a rod screw-threaded at its ends in opposite directions, a motor actuating the said rod, the said motor being pivoted on the pivot shaft of the said crossed arms.

7. In an apparatus for lifting loads, and having two crossed arms each resting on the ground at one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground, the said means for driving the carriages being constituted by a rod screw-threaded at its ends in opposite directions, a motor actuating the said rod, each carriage being pivoted about a horizontal shaft on a nut mounted on the screw-threaded rod, tubular members for receiving the said nuts in order that they may be adjustable in translation, means for preventing these nuts from rotating in the said tubular members, these members being journalled on the said carriages about horizontal trunnions, speed reducing devices for transmitting the movement of the said motor to the said worms in order to determine the displacement in translation of the said carriages, and, consequently, of the said rollers for moving the said arms.

8. In an apparatus for lifting loads, and having two crossed arms each resting on the ground and one end, two thrust members arranged in the opposed angles, having a horizontal bisector, formed by the said arms, a pivot shaft for the said arms, rollers mounted at the ends of the said arms, a platform resting, through the medium of the upper rollers, on the upper ends of the said crossed arms, a connecting rod between the said platform and one of the said arms, and means for moving the said thrust members in order to space the arms apart, carriages, rollers journalled in the said carriages, the said rollers fitting on the said arms, on either side of the pivot shaft, for constituting the said thrust members, means for moving the said carriages

and for determining, under the action of the said rollers, the movement of the said pivoted arms, rolling means at the lower ends of the said arms for facilitating the displacement of the said lower ends on the ground, the said means for driving the carriages being constituted by a rod screw-threaded at its ends in opposite directions, a motor actuating the said rod, each carriage being pivoted about a horizontal shaft on a nut mounted on the screw-threaded rod, tubular members for receiving the said nuts in order that they may be adjustable in translation, means for preventing these nuts from rotating in the said tubular members, other members on which the said tubular members are pivoted about horizontal trunnions, these second members being pivoted on the said carriages through the medium of trunnions at right angles to the trunnions of the tubular members for constituting universal joint couplings between the said nuts and the said carriages, speed reducing devices capable of being pivoted about the pivot shaft of the said arms, the said speed reducing devices transmitting the movement of the said motor to the said worms for determining the displacement in translation of the said carriages and, consequently of the said rollers for moving the said arms.

LOUIS JOSEPH HENRI MARTIN.