

May 15, 1962

J. W. LUDOWICI

3,034,765

LIFTING DEVICES

Filed July 24, 1957

2 Sheets-Sheet 1

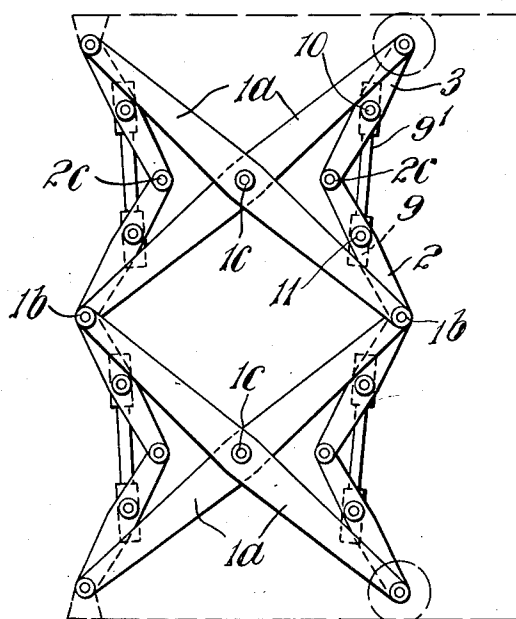


Fig. 1

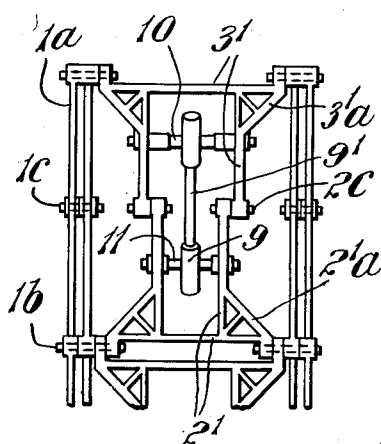


Fig. 2

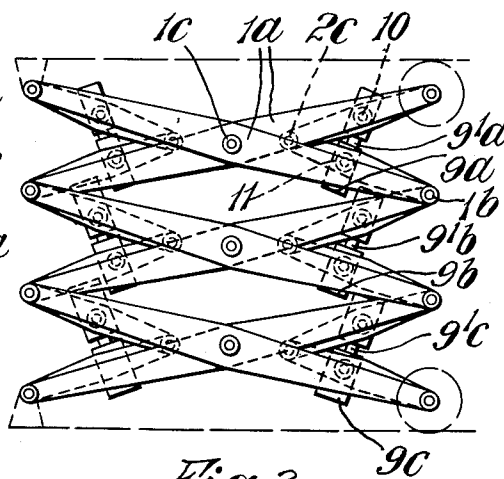


Fig. 3

Inventor:
Johanna Wilhelma Ludowici
by: Michael S. Smiter
1447

May 15, 1962

J. W. LUDOWICI

3,034,765

LIFTING DEVICES

Filed July 24, 1957

2 Sheets-Sheet 2

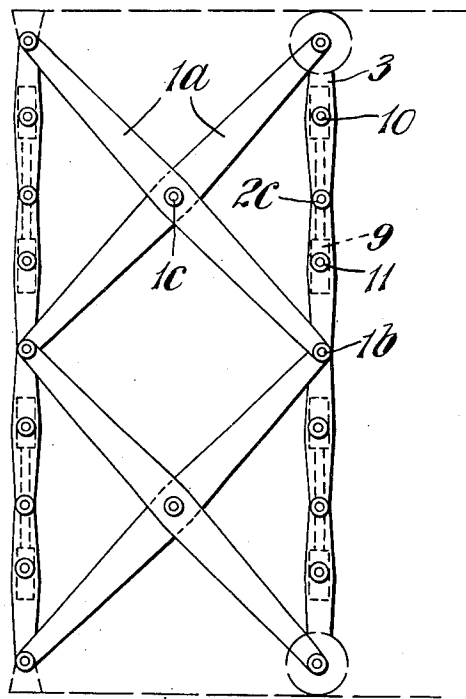


Fig. 4

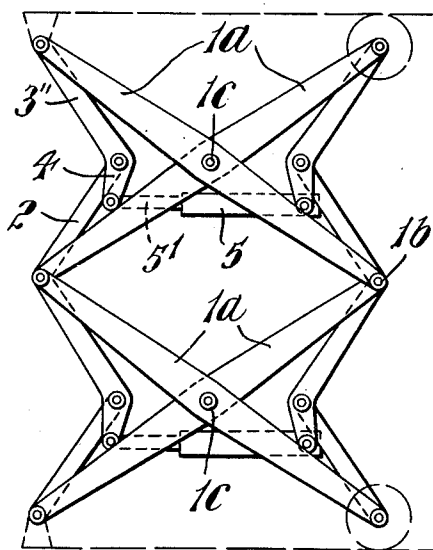


Fig. 5

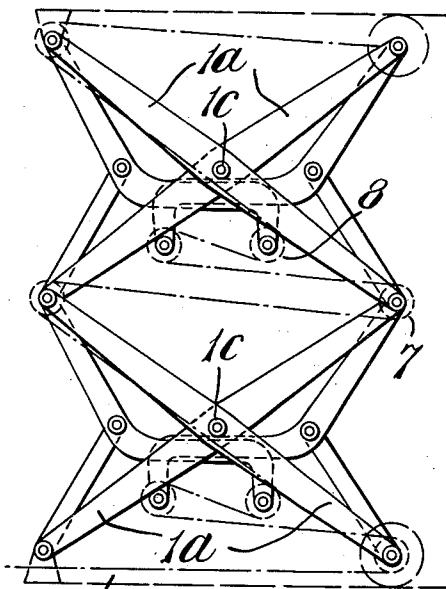


Fig. 6

Inventor:
Johann Wilhelm Ludowici
By: Michael S. Striker
Roy

1

3,034,765

LIFTING DEVICES

Johann Wilhelm Ludowici, Jockgrim, Pfalz, Germany

Filed July 24, 1957, Ser. No. 673,888

6 Claims. (Cl. 254-122)

The present invention relates to lifting devices of the kind comprising a plurality of bars or lifting elements pivotally connected together so as to be movable between collapsed and extended positions in the manner of the so-called lazy tongs.

In arrangements of the kind set out above it has already been proposed to facilitate operation of the same by disposing wire ropes or springs at the pivot points, and in addition locking of the bars in the extended position is obtained by providing locking bars also coupled to the pivot points of the lazy tongs arrangement, such locking bars being foldable into and out of the locking position. The locking bar arrangement is usually referred to as a "pivot bar chain."

It is an object of the present invention to provide a lifting device of the kind set out above having power operated means for facilitating particularly the movement into the extended position.

It is a further object of the invention to provide a construction in which the power of the power operated means is adjusted to suit the operational load required at any point in the length of the device.

It is a still further object of the invention to provide a construction which results in a rigid structure being obtained when the device is in an extended position.

The accompanying drawings show diagrammatically various forms of construction of lifting device, and in which:

FIG. 1 is a front view of one form of construction showing a portion of the length of a lifting device in the partly extended position;

FIG. 2 shows a side view of part of the device shown in FIG. 1;

FIG. 3 shows a device similar to that shown in FIG. 1 in the collapsed position;

FIG. 4 shows the device of FIG. 1 in fully extended position;

FIG. 5 is a view of a front modified construction of lifting device; and

FIG. 6 is a front view of a further modified construction of the lifting device.

In the embodiment shown in FIG. 1 the lazy tong bars or lifting elements of the lifting device are designated 1a, the pairs of bars 1a being pivotally connected together at their intersection points 1c, adjacent pairs of bars being pivotally coupled together at 1b. References 2 and 3 denote the foldable bars or lifting members of a "pivot bar chain." Each pair of lifting members 2, 3 are pivotally connected to each other at one end at a pivot point 2c, whereas the other end of each pair of members 2, 3 is pivotally connected to the adjacent ends 1b of the lifting elements 1a. Each pair of foldable bars 2 and 3 is coupled together by a hydraulic or pneumatic piston 9' and cylinder 9 which is operable by pressure fluid to effect movement of the foldable bars to cause partial extension of the lifting device, e.g. as shown in FIG. 1 or full extension as shown in FIG. 4. The retracted position, in which the members of the lazy tongs lie close together, is shown in FIGURE 3 and is attained by releasing pressure fluid from the cylinders 9. In this position the cylinders 9 lie at an angle.

The bars 2 and 3 may consist of frames 2', 3' as shown in FIGURE 2 which may be reinforced with diagonally arranged bracing members 2'a, 3'a. This construction provides a particularly rigid structure when the lifting device is extended.

2

The lifting device of the present invention is only schematically illustrated in the drawing. However, it will be evident from FIGS. 1 and 2 that the lifting device of the present invention forms a tower-like arrangement on which the lowermost of the lifting elements 1a are supported on the ground, whereas the uppermost of the lifting elements form the top of the tower-like arrangement, and the lifting elements 1a can be moved by the pistons 9' and cylinders 9 from a collapsed position as shown in FIG. 3 to an extended position as shown in FIG. 4. The arrangement may be used for lifting a load.

While FIGS. 1, 3, 4, 5 and 6 show only the front view of the device, it is understood that the device comprises not only a single lazy tong arrangement composed of 15 pivotally connected lifting elements 1a, but two such lazy tongs arrangements arranged in parallel planes and connected by frame-like lifting members 2 and 3 as shown in FIG. 2.

The cylinders 9 and the pistons 9' are respectively pivotally connected adjacent the ends thereof to the lifting members 2 and 3, for instance in the manner as shown in FIG. 2, or in any other convenient manner, at points 10 and 11 which are spaced from the pivot points 2c at which the lifting members 2 and 3 are pivotally connected to each other. Preferably, the arrangement is made in the way as shown in FIG. 3 in which the distance between the connecting point 10 of the piston 9' is spaced from the pivot point 2c a distance smaller than the distance between the pivot 2c and the point 11 at which the cylinder 9 is 30 pivotally connected to the lifting member 2. By means of this arrangement, the cylinder and pistons 9a, 9'a; 9b, 9'b; and 9c, 9'c will assume a position inclined to the longitudinal axis of the device when the device is moved to its collapsed position.

In the embodiment according to FIGURE 5 the foldable bars 3'' are constructed as two-armed levers, the shorter lever arm 4 forming an obtuse angle with the bar 3'' in each case the said shorter lever arms 4 being connected by the cylinder and piston 5. In this way, favourable points of application can be obtained for the lifting force, particularly at the beginning of the lifting movement.

Preferably the pneumatic or hydraulic piston and cylinder arrangements are constructed so that loads can be applied at different points in the length of the lifting device to suit the requirements at that point. For example it is advantageous to make the piston and cylinders at the lower end of the lifting device of greater cross-sectional area than those at higher positions in the length of the device whereby greater force can be applied at the lower end of the lifting device.

The modified construction shown in FIG. 6 is adapted for operation by rope 6. For this purpose each foldable bar 3 is provided at one end with a rope pulley 7 and at the opposite end with a further rope pulley 8 which is carried on a right angled extension of each said bar. The run of the rope 6 passes over the pulleys 7 and 8 so that by shortening the rope length the lifting device is moved to the extended position.

The piston 9' and cylinder 9 of the embodiment shown in FIGS. 1-4, the piston 5' and cylinder 5 of the embodiment shown in FIG. 5 and the rope 6 and pulleys 7 and 8 of FIG. 6 constitute operating means for moving the device between the collapsed and extended positions thereof.

I claim:

1. A lifting device, comprising in combination, a plurality of pairs of elongated lifting elements, the elements of each of the pairs of lifting elements pivoted to each other intermediate their ends at a first pivoting point and the ends of each pair of lifting elements pivoted to the ends of the next following pair of lifting elements in a lazy-tongs-like assembly, the pair of elements at one end

of said assembly serving for supporting the same at the bottom thereof and the pair of elements at the other end forming the top of said assembly; a plurality of lifting means, each of said lifting means associated with one of the pairs of lifting elements respectively and consisting of two pairs of lifting members arranged respectively at opposite sides and laterally of the pivot point of the associated pair of lifting elements, each of said lifting members pivoted to one of said lifting elements spaced from the pivot point thereof and the lifting members in each pair pivotally connected to each other at a second pivot point at the other ends thereof; and a plurality of operating means respectively associated with said pairs of lifting members, said operating means being pivotally connected at opposite ends thereof, respectively, to the corresponding pair of lifting members at points spaced from said second pivot point thereof for moving the same between a collapsed position in which the points of pivoting of said lifting members to the corresponding lifting elements are in a nearer position from each other and an extended position in which said points of pivoting of said lifting members to said lifting elements are at a farther position from each other.

2. A lifting device according to claim 1, wherein one in each pair of lifting members is in the form of angle levers.

3. A lifting device according to claim 1, wherein the lifting members are constructed as frames to provide a rigid structure.

4. A lifting device according to claim 1, wherein the lifting members are provided with diagonal bracing members to provide a rigid structure.

5. A lifting device, comprising in combination, a plurality of pairs of elongated lifting elements, the elements of each of the pairs of lifting elements pivoted to each other intermediate their ends at a first pivoting point and the ends of each pair of lifting elements pivoted to the ends of the next following pair of lifting elements in a lazy-tongs-like assembly, the pair of elements at one end of said assembly serving for supporting the same at the bottom thereof and the pair of elements at the other end forming the top of said assembly; a plurality of lifting means, each of said lifting means associated with one of the pairs of lifting elements respectively and consisting of two pairs of lifting members arranged respectively at opposite sides and laterally of the pivot point of the associated pair of lifting elements, each of said lifting members pivoted to one of said lifting elements spaced from the pivot point thereof and the lifting members in each pair pivotally connected to each other at a second pivot point at the other ends thereof; and a plurality of operating means each associated with one of said pair of lifting members, each of said operating means including a cylinder and a piston slidably arranged therein and operable

by fluid pressure, said piston and cylinder respectively pivotally connected to said pair of lifting members associated therewith at points spaced from said second pivot point thereof for moving said lifting members between a collapsed position in which the points of pivoting of said lifting members to the corresponding lifting elements are in a nearer position from each other and an extended position in which said points of pivoting of said lifting members to said lifting elements are at a farther position from each other.

6. A lifting device, comprising in combination, a plurality of pairs of elongated lifting elements, the elements of each of the pairs of lifting elements pivoted to each other intermediate their ends at a first pivoting point and the ends of each pair of lifting elements pivoted to the ends of the next following pair of lifting elements in a lazy-tongs-like assembly, the pair of elements at one end of said assembly serving for supporting the same at the bottom thereof and the pair of elements at the other end forming the top of said assembly; a plurality of lifting means, each of said lifting means associated with one of the pairs of lifting elements respectively and consisting of two pairs of lifting members arranged respectively at opposite sides and laterally of the pivot point of the associated pair of lifting elements, each of said lifting members pivoted to one of said lifting elements spaced from the pivot point thereof and the lifting members in each pair pivotally connected to each other at a second pivot point at the other ends thereof; and a plurality of operating means each associated with one of said pair of lifting members, each of said operating means including a cylinder and a piston slidably arranged therein and operable by fluid pressure, said piston and cylinder respectively pivotally connected to said pair of lifting members associated therewith at points differently spaced from said second pivot point thereof for moving said lifting members between a collapsed position in which the points of pivoting of said lifting members to the corresponding lifting elements are in a nearer position from each other and an extended position in which said points of pivoting of said lifting members to said lifting elements are at a farther position from each other, whereby when said lifting members are in said folded position thereof that piston and cylinders will assume a position inclined to the longitudinal axis of the lifting device.

References Cited in the file of this patent

UNITED STATES PATENTS

50	2,704,199	Olson	Mar. 15, 1955
	2,829,863	Gibson	Apr. 8, 1958

FOREIGN PATENTS

726,658	Great Britain	Mar. 23, 1955
---------	---------------	---------------