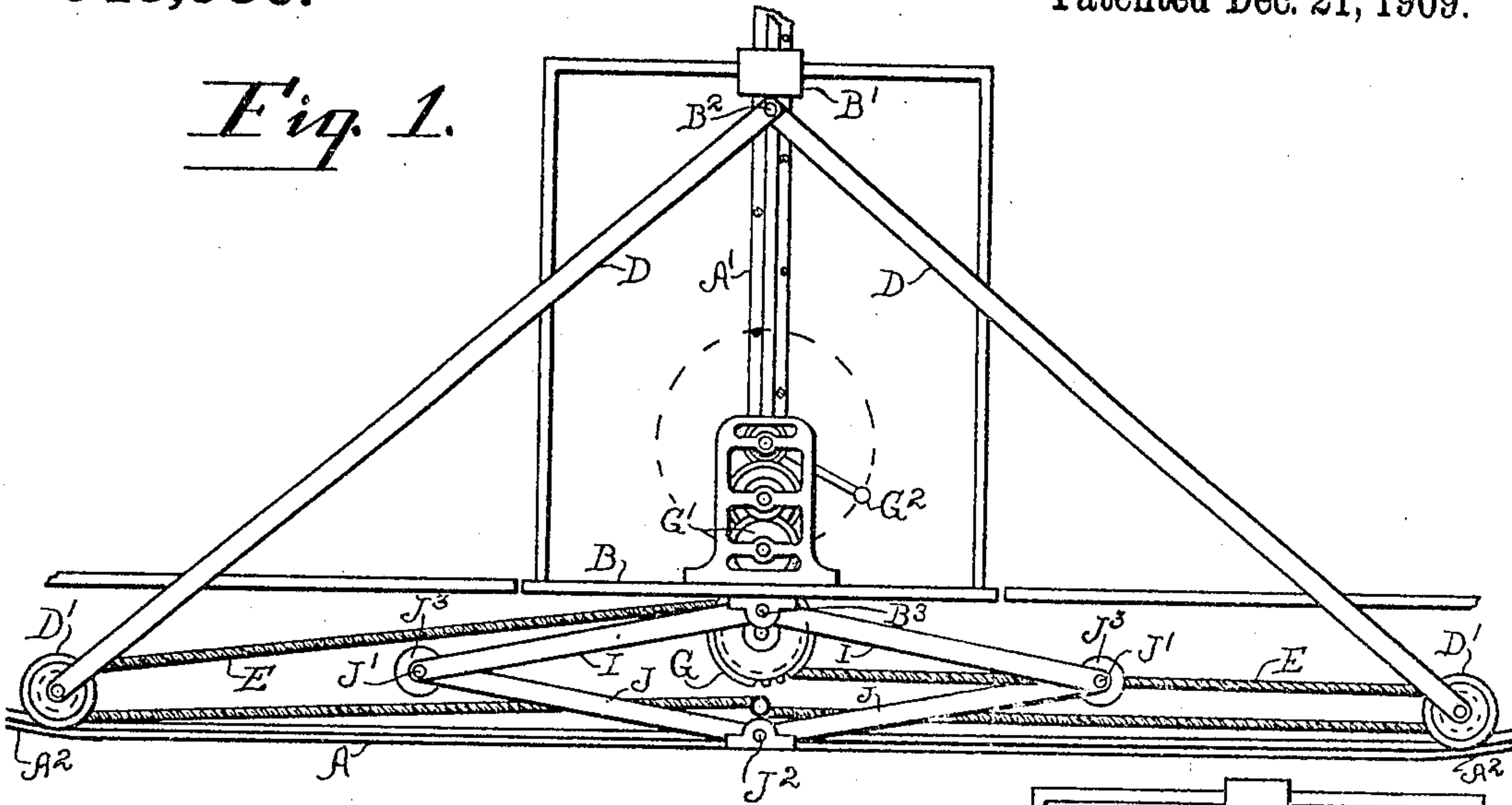


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ELEVATING DEVICE.  
APPLICATION FILED JAN. 21, 1909.

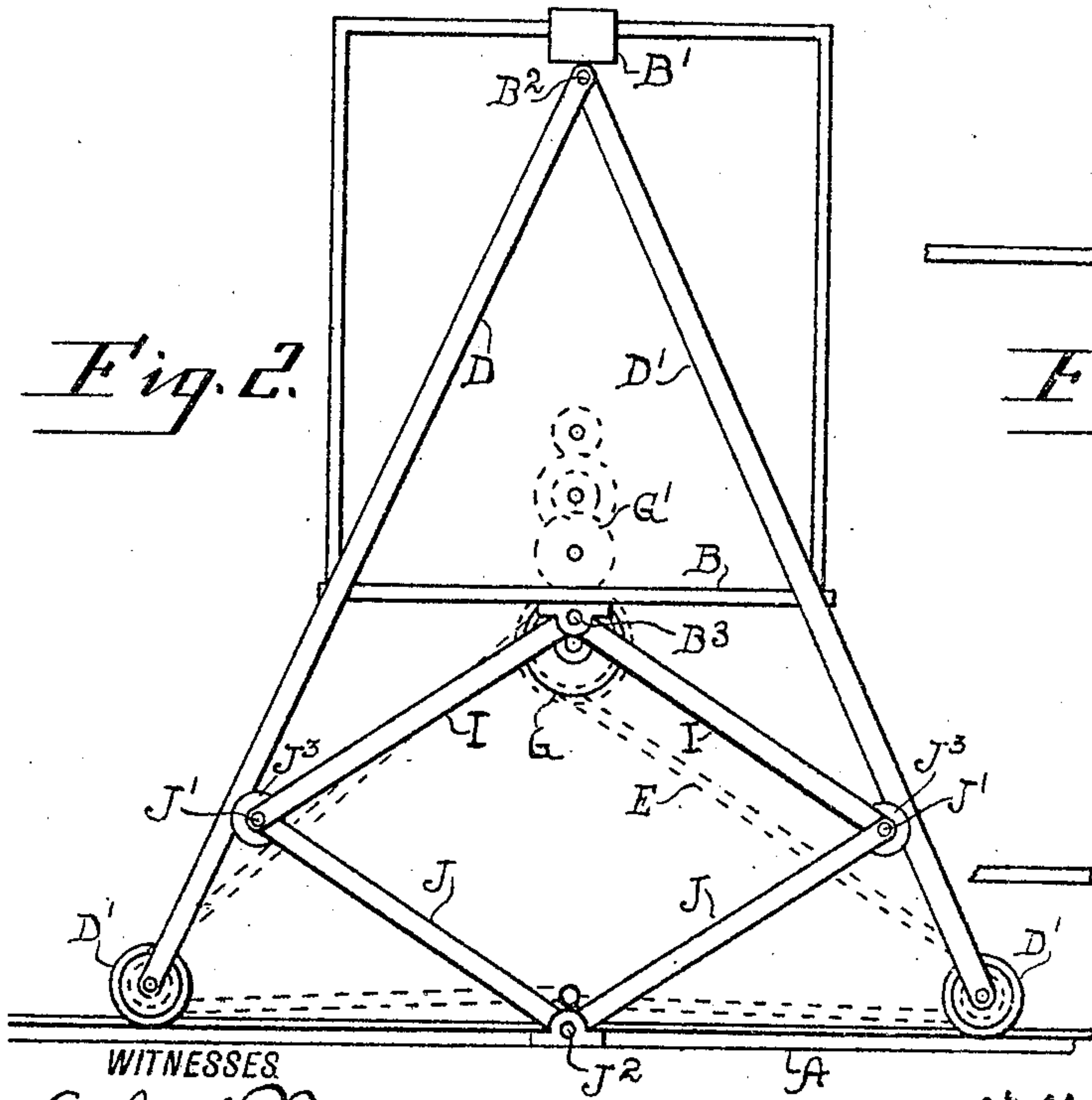
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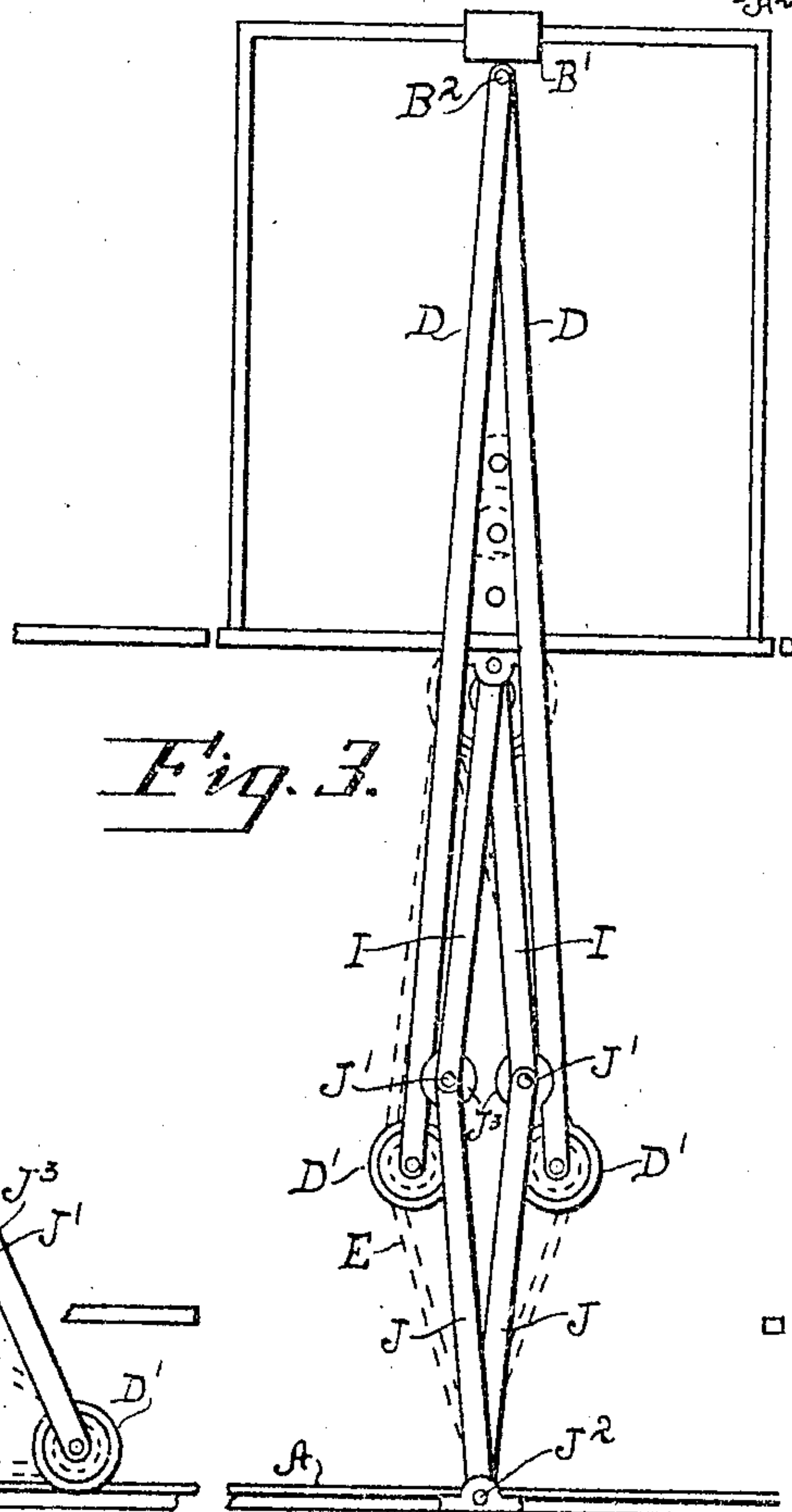
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## ELEVATING DEVICE.

943,936.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed January 21, 1909. Serial No. 473,478.

*To all whom it may concern:*

Be it known that I, WILLIAM HENRY HUNT, a citizen of the United States, residing in the borough of Manhattan, in the city and State of New York, have invented a certain new and useful Improvement in Elevating Devices, of which the following is a specification.

The advantages to be obtained from the toggle principle by a judicious use of obliquely arranged links have long been known. An objection appears in the change of the relations of speed and force as the action proceeds.

I have discovered that two sets of links acting togglewise can be arranged to succeed each other, the second set commencing to serve as the first set is about to become too slow. I have invented means for applying this in any positions where the motion required is of moderate range and uniform. I can work with little friction or wear and attain several important ends.

I will describe the invention as applied to an elevator used in handling carriages where the lift is only one story of an ordinary building. I will assume it to operate slowly by the strength of one attendant applied to a crank, under which conditions the arrangement serves to facilitate the work not only of hoisting and lowering, but also of bringing and taking away the load. A hoisting crank and the necessary speed-reducing gear are carried upward and downward with the car and the load. The mechanism comprises two sets of oblique-acting links acting toggle-wise in succession, one set giving the car about half the lift required and then surrendering the work to the other but still remaining the medium for the transmission of the force required. I will describe the operation as effected by the patient turning of a hand crank. By bending a portion near each end of a bottom rail the resistance to starting the load in ascending may be reduced to any extent desired, always of course at a sacrifice of time; it will start upward slower.

The invention insures that the load may be completely sustained in its extreme highest position independent of any locking or additional means of holding.

The following is a description of what I

consider the best means for carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation with the car in nearly its lowest position. Fig. 2 shows the same with the car further hoisted, and Fig. 3 the same with the car in nearly its highest position.

The figures represent the novelty with so much of the ordinary parts as seems necessary to show the action.

Similar letters of reference indicate like parts in all the figures where they appear.

A A are parallel rails forming a base, and A' A' are upright guide ways by which the car is guided in its rising and sinking movements. The rails are mainly straight and level, but each is upwardly curved near each end, A<sup>2</sup> A<sup>2</sup>.

B is the bottom or platform and B' is the head or top of the car.

B<sup>2</sup> are horizontal pins in the head which loosely connect long pieces D which I will term derrick-bars, at the lower end of each of which is a double flanged wheel D' adapted to travel on the corresponding rail and strong enough to carry a load. There are two of these pairs of derrick rods or bars, one pair at each side. They carry the load during the first part of the rising and the last part of the sinking motion of the car. Four ropes or chains E are provided, two on each side.

G is a windlass extending across under the car-bottom and carried in bearings bolted thereto.

G' is a series of multiplying gears connecting the windlass to a hand crank G<sup>2</sup> conveniently placed to be turned by the operator who works at one side of the car and goes up and down with it after adjusting the load thereon. Each rope is extended around a pulley pivoted on one of the derrick-bars; as shown such pulley is on the same short shaft as the corresponding bearing wheel D' at the foot and as the windlass turns in one direction or the other, it takes up or pays out the ropes E and thereby draws the derrick-bars together to raise, or allows them to separate to lower, the car and its load.

The bottom rails A may be ordinary light



railway-rails allowing of being bent, and each end is bent upward so much as shall by calculation and by practice be found expedient to softly arrest the descent of the car if it shall ever be allowed to come down too fast, and to facilitate the commencement of the act of drawing the derrick bars together and thus initiating the lifting movement of the car.

In the lower part of its motions the weight of the car and its load is carried by thrusting strains on the derrick bars. There is a further series of lifting and supporting links which peculiarly serve in the higher part of its motions. The hoisting and lowering by all the mechanism is effected by the single windlass, G. A single operator can place the carriage or other load on the platform or base B of the car and working vigorously for a few minutes raises or lowers and takes the load away. I will refer to the additional mechanism as short links. Four short links on each side are arranged diamond-wise or in diamond outline, one set of four links composing one diamond on the near side, the side nearest the eye in the figure, and another similar diamond figure or set of four short links, on the farther side. Observe the details.

I, I are the upper links on the near side flexibly pinned together and to the base of the car by a smooth pin B<sup>3</sup>.

J, J are the lower links. A pin J' flexibly joins each lower link J to the corresponding link I, and a pin J<sup>2</sup> flexibly joins each link J to the rail A or properly associated fixed parts constituting the base of the structure. The lower ends of the upper links I or the upper ends of the lower links J or both are properly formed to afford a fair bearing for the inner faces of the derrick-bars D.

In raising the car and its load the windlass is turned and takes up the ropes E and draws the derrick-bars together until the lift is about half completed, the lifting action obtained from the derrick-bars slows, but before this slowing becomes serious the inner faces of the derrick bars strike and press inward against the joined ends of the short links I J, I J. Now a new régime obtains. The inward movement of the derrick-bars now acting on the joining angles of the short links I, J, forces these points inward and causes the diamond group I I and J J to elongate upward giving a new lease of life to the rising motion. The wheels D' during the remainder of the lifting will be idle, so also will the derrick-bars, except that they serve as the medium through which the dynamic action applied through the crank is conveyed to the short links. The wheels D' are lifted clear of the rail A. The change of condition requires no attention from the operator; he simply continues to revolve the hand crank

and take up the ropes, and the lifting process is soon performed solely by the short links. The parts should be so proportioned that a little before the sets of short links have attained their greatest upward stretch the platform B of the cage is flush with the second floor of the building and the conditions are right for removing the load, assumed to be an automobile or other carriage, and the transfer from the lower to the higher level is completed. The reverse of these movements effects a lowering of the car and the load. The nearly upright position of the short links at the termination of the rising movement so reduces the disposition to a backward movement that it is easy to hold the car in the elevated position. I believe that the slight friction of the gearing may be relied on to hold the car in its most elevated position without any other fastening. When it is desired to lower the car, the operator, after adjusting the load if any, simply turns the windlass in the direction to lower. If, when thus relieved from the slight resistance due to friction, the elevator does not descend, a little help by the hand or the foot of the operator will initiate the spreading apart of the short links and the descent will proceed.

I provide each angle of the links I and J with a roller J<sup>3</sup> which insures the proper reception of the derrick-bar and makes a nearly frictionless bearing therefor.

I use the term ropes to include other suitable flexible tensile material as chains.

I have described the parts as used on both sides of the car,—but in some cases the parts for one side may be used alone, located at the midwidth.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. What I have termed the car may be an open-work structure, simply a platform and braces and a head. Anti-friction bearings may be provided for the several bearings, making it easier to lift, but reducing the liability of its hold in the elevated position. An electric or other motor may be used in place of the crank and gearing or in addition thereto other means than the uprights A' may be used for guiding. There may be a counterbalance weight rigged in any usual or suitable manner to perform its usual functions. A ratchet and pawl may be used to hold at any stage. A brake may be employed to reduce the labor and shorten the time of lowering. I can chip and file or otherwise modify the upper surfaces of the rails A without bending or in addition thereto.

I claim as my invention:

1. A hoisting mechanism comprising a load holding device, a pair of variably inclined links and bearing wheels on each side of said load holding device arranged to



act togglewise, a pulley on each link, ropes running on said pulleys, a single windlass mounted on the load holding device, and with which the ropes are connected, and  
5 means for operating said windlass.

2. A hoisting apparatus comprising a load receiving device, means for guiding said device, a set of oblique links, and means for actuating them to induce a portion of  
10 the required movement, a second set of oblique links, means for transferring the load automatically to the second set of oblique

links and for operating said second set of links.

3. A hoisting mechanism comprising the 15 combination of two sets of oblique acting links arranged to serve in succession, and a single operating means for both.

Signed at New York city this 7th day of January 1909.

WILLIAM HENRY HUNT.

Witnesses:

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