

(No Model.)

A. J. McADAM.

2 Sheets—Sheet 1.

HYDRAULIC ELEVATOR.

No. 462,955.

Patented Nov. 10, 1891.

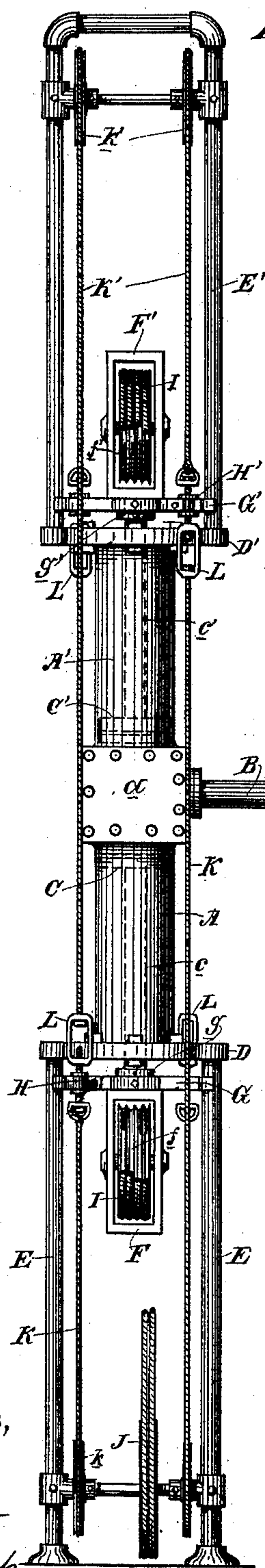


Fig. 1.

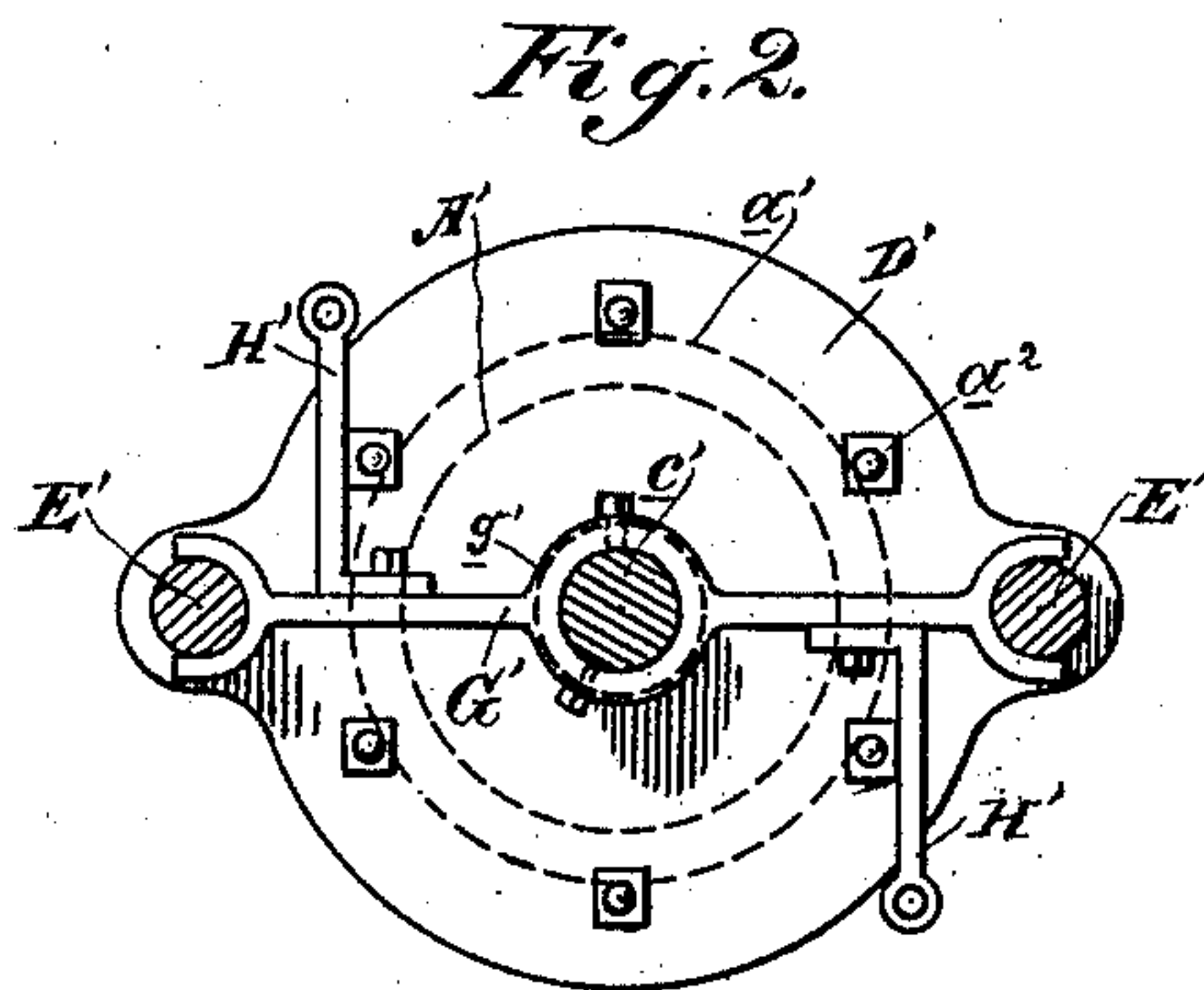


Fig. 2.

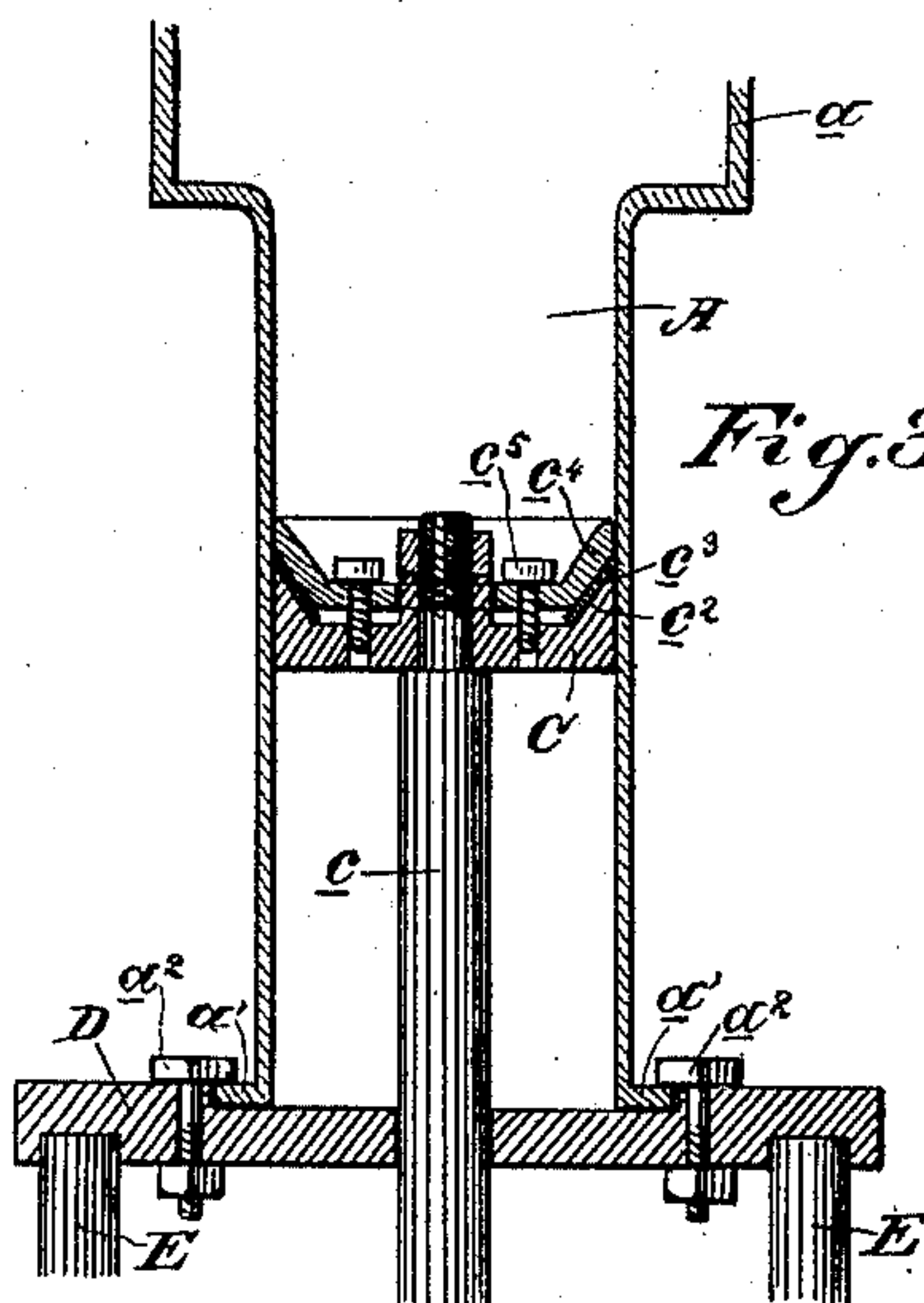
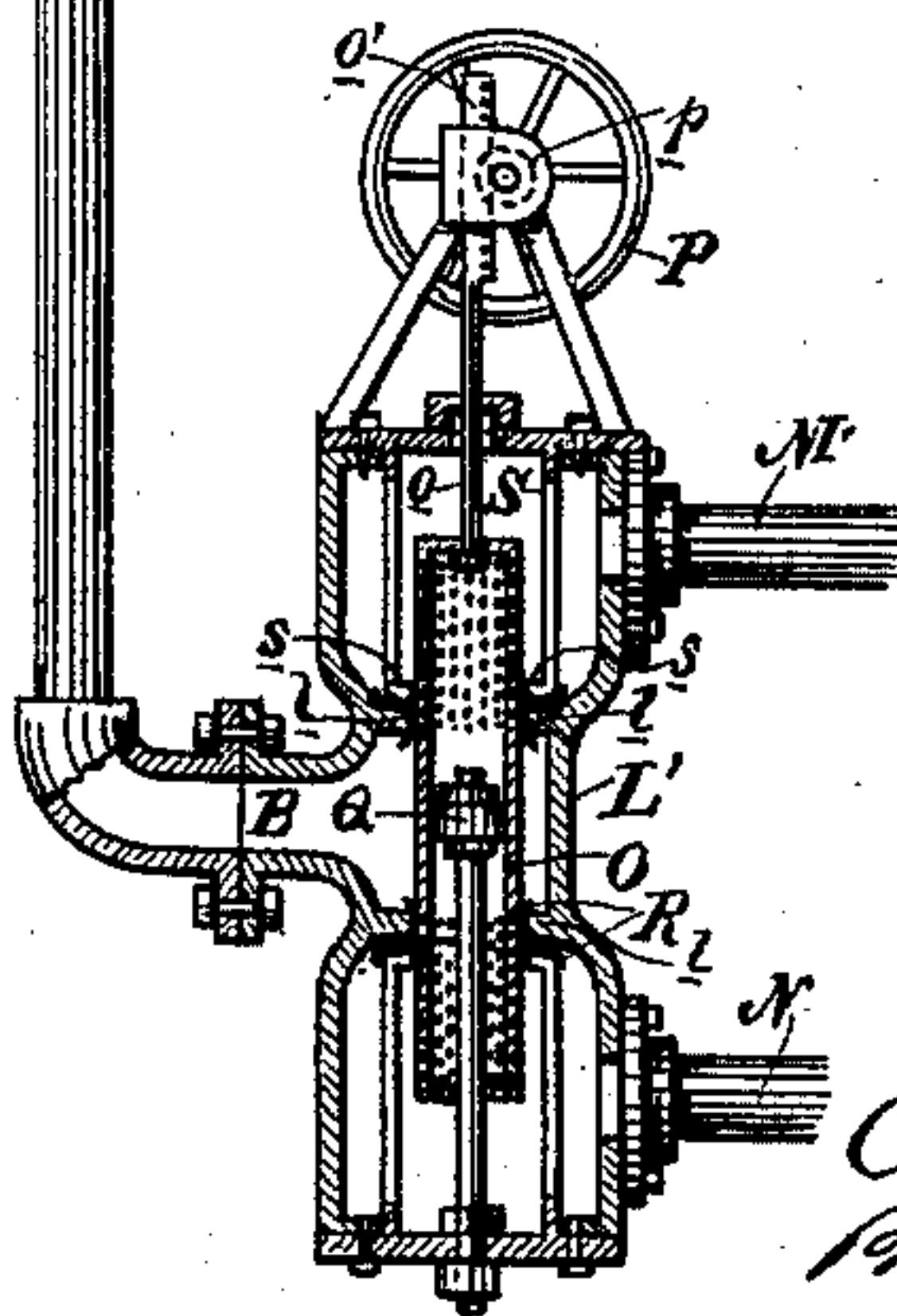


Fig. 3.



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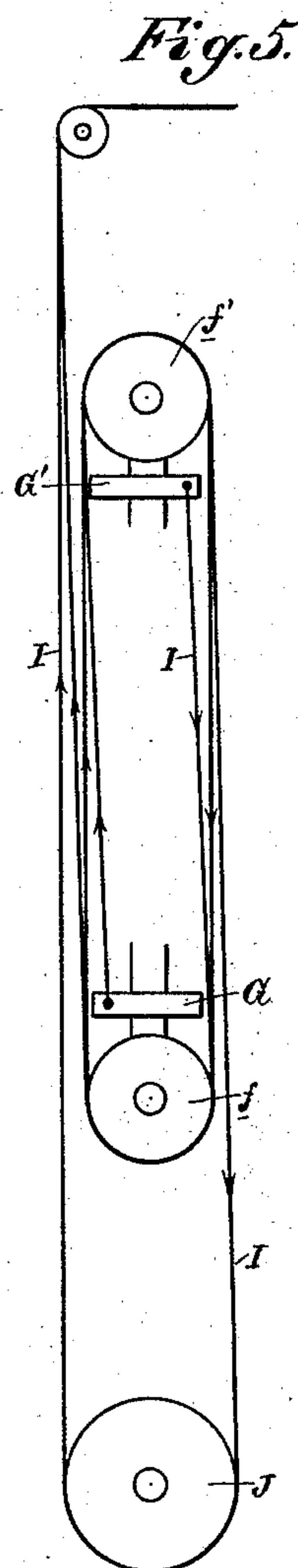
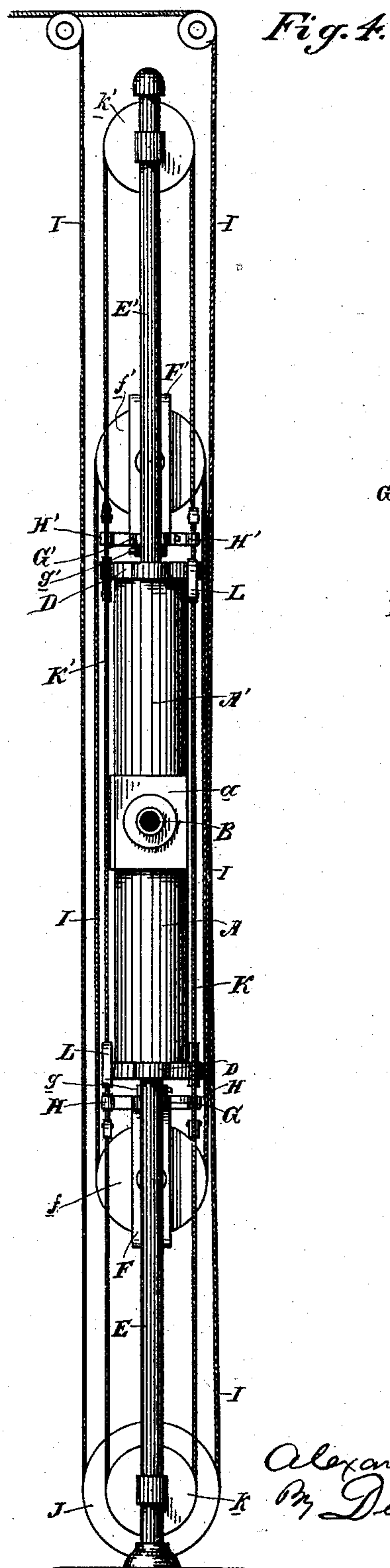
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ALEXANDER J. MCADAM, OF SAN FRANCISCO, CALIFORNIA.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 462,955, dated November 10, 1891.

Application filed March 30, 1891. Serial No. 387,021. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER J. MCADAM, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Hydraulic Elevators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of elevators operated by means of water under pressure acting through moving pistons connected by suitable ropes or cables with the traveling cage or car.

My invention consists in the novel construction, combination, and arrangement of parts hereinafter fully described, and specifically pointed out in the claims.

The object of my invention is to provide a simple and effective hydraulic elevator in which great economy in the consumption of water is secured.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is an elevation of my elevator. Fig. 2 is a plan of the connection between the cylinder end and the supporting-plates, showing also one of the guide-bars. Fig. 3 is a section of cylinder and piston. Fig. 4 is an elevation of the device, taken from the water-inlet side. Fig. 5 shows a modification of the attachment of ropes I.

Though my invention is applicable to both horizontally and vertically arranged cylinders, I have herein shown the vertical arrangement.

A is one cylinder and A' is the other cylinder, the two being connected by a suitable union, forming a chamber *a* and having communicating with it the inlet-pipe B, by which water is supplied to the two cylinders at a point between them.

In the cylinder A is a piston C, and in the cylinder A' is a piston C', each piston having a rod *c* and *c'*, respectively. The lower end of the cylinder A is supported upon a ring D, which is itself carried by the standards E. The piston-rod *c* of piston C extends down, and its lower end is secured to or formed with a frame F, in which are mounted and carried the sheaves *f*. The piston-rod passes through a guide-bar G, upon which it bears by means of a collar *g*, so that when said piston-rod

moves down it will move the guide-bar down; but it can be turned in said guide-bar in order to permit the adjustment of the pulley-frame F and sheaves to the twisting of the ropes passing over said sheaves. It is fixed when adjusted to the point desired by a suitable set-screw. The ends of the guide-bar G are fitted to and adapted to slide up and down upon the standards E. Bolted near each end of the guide-rod G and on opposite sides thereof are the arms H.

The parts of the upper cylinder A' are similarly constructed, the upper end of said cylinder bearing upon a plate or ring D', which supports standards E'. The rod *c'* of the upper piston is secured to or formed with a sheave-frame F', carrying the sheaves *f'*, and said rod passes through a guide-bar G' and bears on it by means of a collar *g'*. The bar G' has extending oppositely from it the arms H'. Passing back and forth between the sheaves *f* and *f'* is the hoisting-rope I. For safety I use two ropes I side by side. One end of these ropes leads directly off the lower sheaves *f* upwardly over suitable guide-pulleys above and is connected properly with the cage or car. The other end is carried downwardly around a fixed sheave J, secured to the lower ends of the standards E, and up over guide-pulleys above and is secured to the car. The object of this is to relieve in part the upstrain upon the pistons and to also relieve the strain upon the connecting ropes or cables, which I shall now describe. K is one of these connecting-ropes, which starts at one of the arms H of the guide-bar G. It thence passes downwardly around a stationary sheave *k* below and up on the opposite side of the guide-bar without being attached to it, and thence upwardly to and is attached to the arm H' of the upper guide-bar G'. A second rope or cable K' is attached to this arm H', and thence passes upwardly over a stationary sheave *k'* in the top of the standards E', and thence downwardly past the guide-bar G' without being secured to it, and down to the guide-bar G, to which it is secured. The connection between the adjacent ends of the cables K and K' is formed by a turn-buckle and bolt, (represented by L,) whereby these can be tightened when necessary. Now on the other side of the bars G and G' are ropes or cables pre-

cisely similar to K and K' and similarly lettered, the only difference being that their points of connection with the guide-bars G and G' are the reverse of those on the first side. This arrangement forms endless belts of said cables, and the object of attaching them oppositely to the guide-bars is to effect an equal strain upon the two bars and cause them to move true.

The object of the connecting-cable K and K' is to hold the pistons together and insure their acting in unison.

The connection between the ends of the two cylinders and the rings D and D' is a rotary adjustable one formed by flanges a' on the ends of the cylinders fitting shoulders in the rings and held to place by large headed bolts a^2 . By loosening these bolts slightly the parts may be rotatively adjusted to any position desired, and the heads of said bolts serve as bearings on which the turning may take place.

The packing of the piston is formed as follows: The piston-body is formed with beveled under surfaces c^2 , against which one or more rings of leather c^3 are fitted, said rings being held to place by means of a clamp-plate c^4 bearing against them and held to the body by means of bolts c^5 . The position of the leather rings is such that they need not be cupped, as is usual, but can be straight flat pieces of leather.

The supply-pipe B is controlled by a valve constructed as follows: L' is the valve-shell. With one end the feed-pipe M communicates and with the other end the exhaust-pipe N is connected. With the center the inlet-pipe B communicates. Within the shell is seated the tubular valve O, having a central imperforate portion and perforated end portions. The valve has a stem o , provided with a rack o' , with which engages a pinion p on the shaft of the operating-wheel P.

Q is a stationary piston secured to the shell and fitting within the tubular valve. Now when the valve occupies a central location all the communications are cutoff. The water in the pipe B cannot escape because of the imperforate center of the valve which opposes it. Water cannot come in through pipe M because of the stop-piston Q, nor can any water exhaust. The elevator is then in a state of rest. To feed the water the valve O is moved down, and the water will then pass through the perforated upper end into pipe B. To exhaust the water the valve is raised, and it will then flow out from pipe B through the perforated lower end of the valve.

The valve O is packed by means of the packing-strip R, seated against a shoulder l in the shell, and held to place by means of an inwardly-projecting flange s , carried by a plate S, bolted to the ends of the valve-shell. The flange s has openings in it to permit the passage of water.

The operation of my elevator is as follows: The water is supplied by the operation of the

valve, as just described, and passes in through the pipe B into the chamber a between the two pistons C and C'. These pistons are thereby forced apart and carry with them the sheaves f and f' , the separation from each other of which lengthens out the folds of the ropes or cables passing between them, and thereby draws down on the ends of said ropes or cables, whereby the cage or car to which they are attached is elevated. The two pistons work in absolute unison by reason of the connecting-cables K K'. To lower the cage the valve O is operated to effect the exhaust from pipe B, whereby the weight of the cage pulls the two pistons together again. By this arrangement of the hoisting-ropes passing between the sheaves f and f' and secured at both ends to the car or cage economy of water is effected, as its entire pressure is caused to act upon moving parts, which is not the case in those elevators in which one end of the cable is attached to a solid fixture. There is a saving also in having two pistons acting on the ropes instead of one. It is not essential, however, that both ends of the ropes I be secured to the cage or car, for, as shown in Fig. 5, one end of one rope I may be secured to the upper guide-bar G, and after passing between the sheaves f and f' leads down around pulley J and thence up to the cage or car. The other rope I is secured to the lower guide-bar G and leads finally off the lower sheaves f up to the car. By this arrangement I avoid a solid fixture connection and can employ fewer sheaves f and f' .

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A hydraulic elevator comprising oppositely-moving pistons connected with the cage or car of the elevator, having a water-inlet discharging between the pistons for moving the latter in opposite directions, a valve controlling said pipe and consisting of a shell, a tubular valve therein having its ends perforated, feed and discharge pipes at opposite ends of the shell, and a fixed piston within the tubular valve, substantially as herein described.

2. In a hydraulic elevator, the combination of oppositely-moving pistons operated by the pressure of water admitted between them, piston-rods extending from the pistons and having frames upon their outer ends, slidable guide-bars through which the piston-rods pass, said bars being operated by said rods, sheaves mounted in said frames, the ropes or cables passing between said sheaves and connected with the cage or car, and the connecting-ropes K and K' between said guide-bars, substantially as herein described.

3. In a hydraulic elevator, the valve for controlling the inlet-pipe, consisting of the shell L', the reciprocating tubular valve O therein having an imperforate central portion and perforated ends, the feed-pipe at one end of the shell, the discharge-pipe at the

other end of the shell and the inlet-pipe at the central portion of the shell, and the fixed piston within the tubular valve, substantially as herein described.

5 4. In a hydraulic elevator, the valve for controlling the inlet-pipe, consisting of the shell L', the reciprocating tubular valve O therein having an imperforate central portion and perforated ends, the feed-pipe at one
10 end of the shell, the discharge-pipe at the other end of the shell and the inlet-pipe at the central portion of the shell, the fixed pis-

ton within the tubular valve, the end plates S, provided with inwardly-extending flanges s, the packing-seat flanges l, and the packing R, held to said seat-flanges by the flanges s of the plates S, substantially as herein described.

In witness whereof I have hereunto set my hand.

ALEXANDER J. McADAM.

Witnesses:

S. H. NOURSE,

J. A. BAYLESS.