

(No Model.)

2 Sheets—Sheet 1.

M. O. AINSLIE.
RECIPROCATING BOAT PADDLE.

No. 461,067.

Patented Oct. 13, 1891.

Fig. 1.

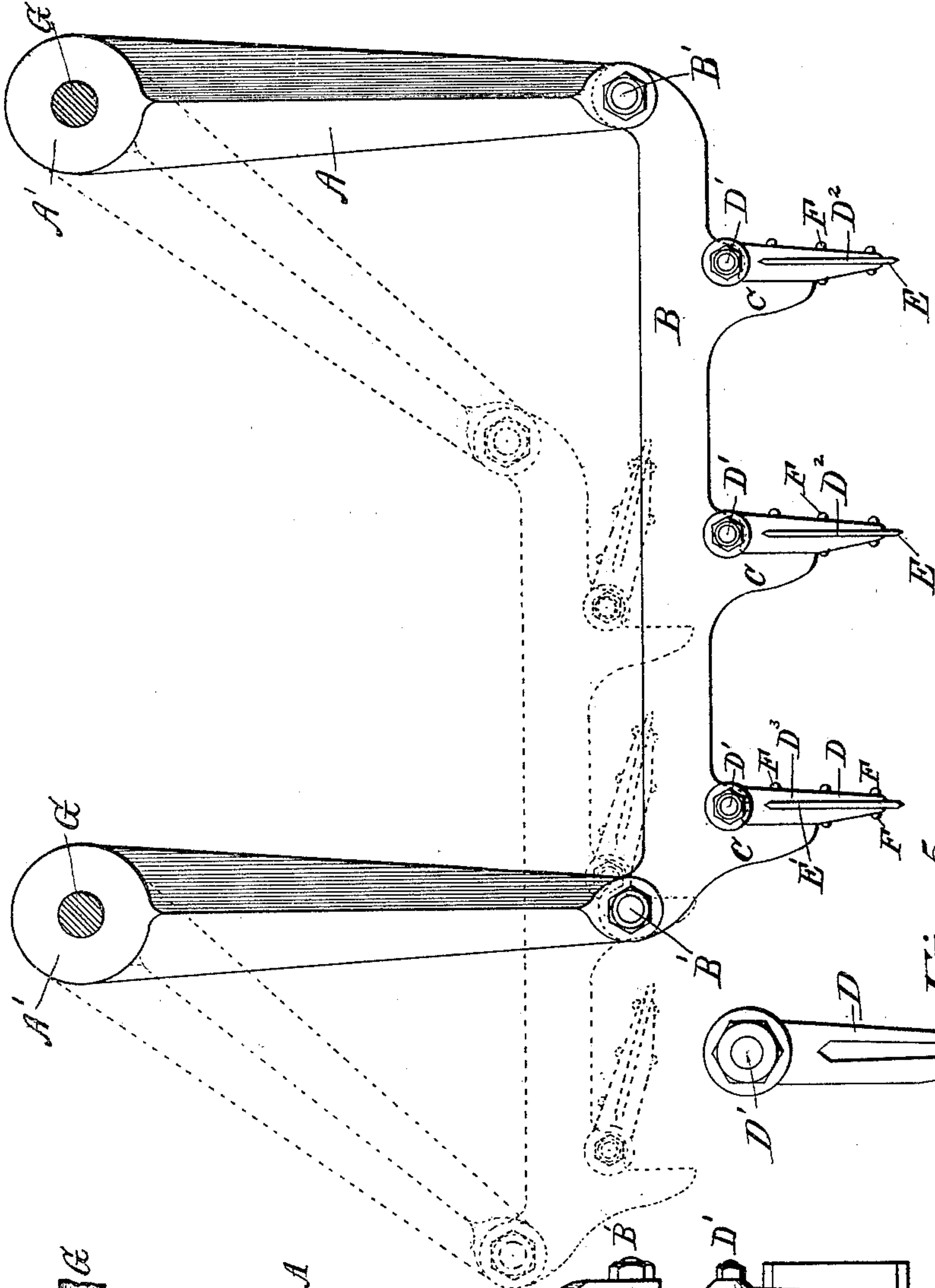


Fig. 2.

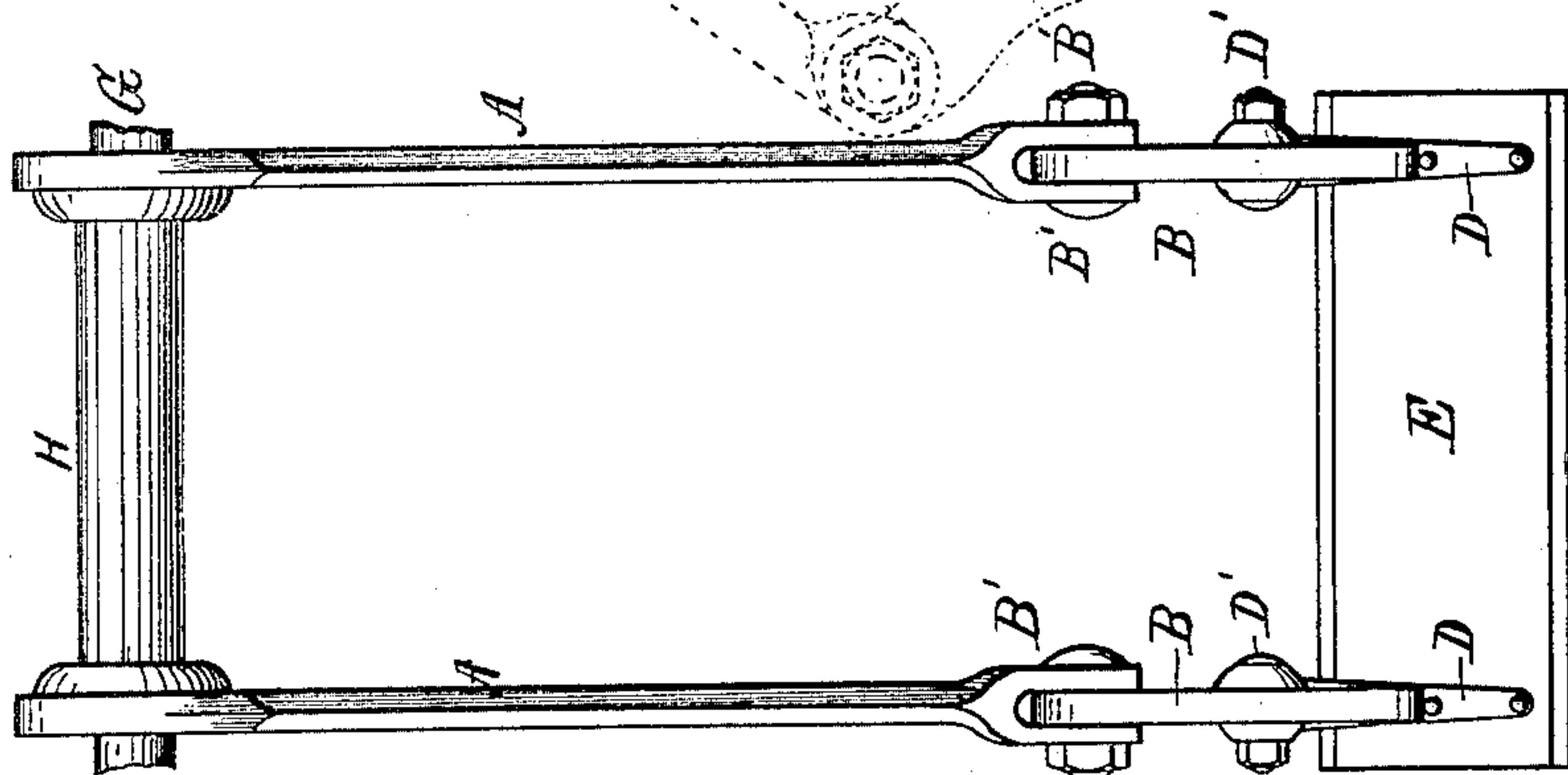
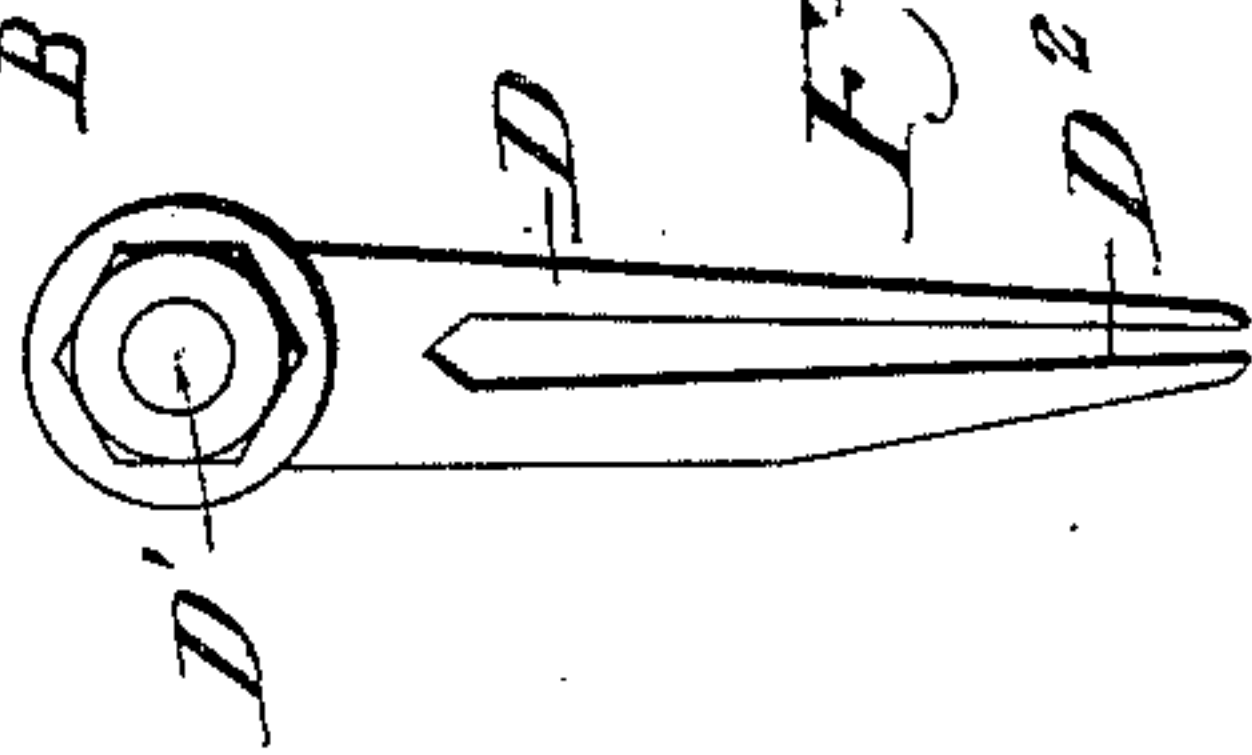


Fig. 5.



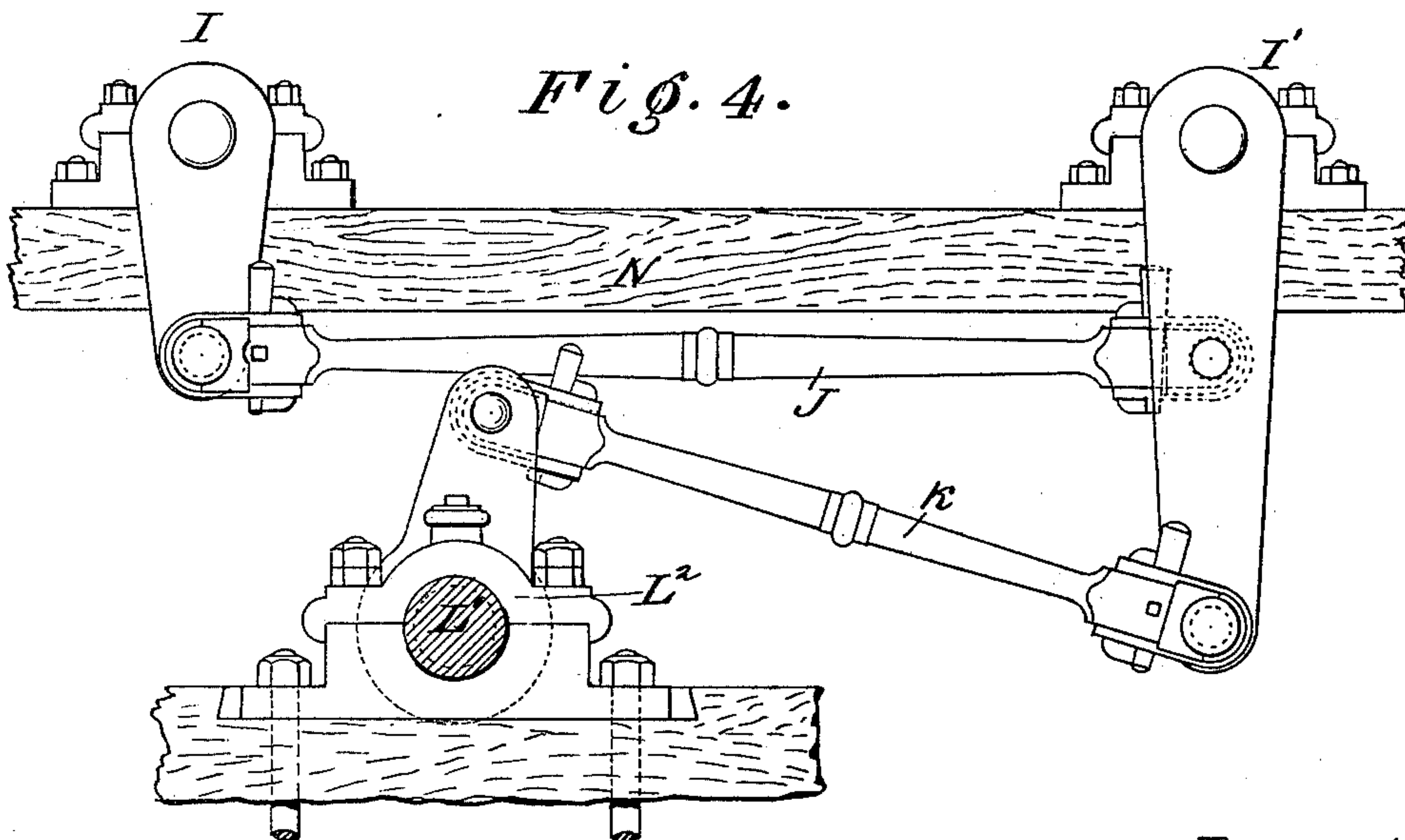
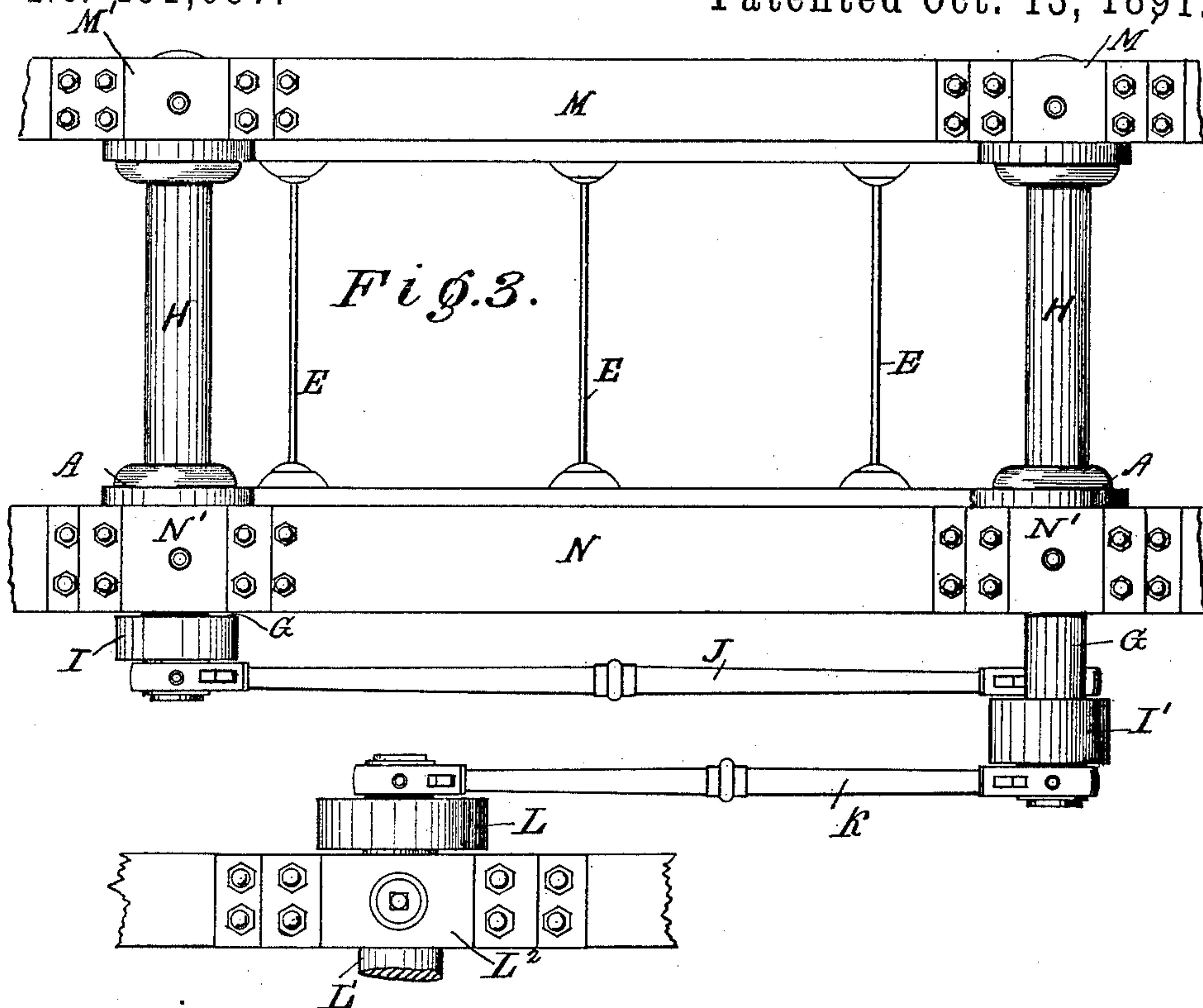
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UNITED STATES PATENT OFFICE.

MARK O. AINSLIE, OF CINCINNATI, OHIO.

RECIPROCATING BOAT-PADDLE.

SPECIFICATION forming part of Letters Patent No. 461,067, dated October 13, 1891.

Application filed May 27, 1890. Serial No. 353,344. (No model.)

To all whom it may concern:

Be it known that I, MARK O. AINSLIE, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Paddles for the Propulsion of Boats, of which the following is a specification.

The several features of my invention and the various advantages arising from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this specification, and to which reference is hereby made, Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is an end view of the said device, that end of the device shown in the said figure being the one which would be seen by the spectator when located at the left hand of Fig. 1 and looking toward said Fig. 1. Fig. 3 is a plan view of the said device when the same is combined with supporting-beams and provided with an operating connecting-rod, pitman, and crank-support. Fig. 4 is a side elevation of the parts combined and shown in Fig. 3. Fig. 5 is an end elevation of any one of the paddles and of the paddle-holder whereby it is supported, this figure being made upon an enlarged scale.

A A A A respectively indicate the swinging arms whereby the paddle-beam or equivalent part of the device is supported. Two of these arms—viz., a front and a rear arm—lie in a plane preferably parallel to the vertical longitudinal central plane of the vessel or boat to which my invention is applied, and the other two arms—viz., a front and a rear one—lie in a plane parallel to the first-named plane and at a sufficient distance therefrom to properly uphold the devices which are to be supported by it, as hereinafter mentioned.

The first-named pair of swinging arms A A uphold a paddle-beam B. One end of this paddle-beam is pivoted to the forward swinging arm by a pivotal connection B', and the rear end of the said paddle-beam is similarly pivoted to the rear adjacent swinging arm by a pivotal connection, as B'. The other and parallel pair of swinging arms A A are similarly pivoted to the paddle-beam B. The first-

named paddle-beam is like the last-named one. The forward end of this last-named beam is pivoted to its adjacent forward swinging arm A and the rear end is pivoted to its adjacent rear swinging arm A. The two paddle-beams lie in parallel planes, and the pivotal means for making the pivotal connection between them and their respective swinging arms are preferably identical.

The paddle-beam is constructed as follows: It is provided with one or more stop-lugs or stop-arms C. In the present illustrative instance each of the paddle-beams is provided with three of these stop-lugs or stop-arms. The forward end of each lug or stop-arm is preferably curved downward and backward, substantially as shown, so as to diminish its frictional contact with the water through which it moves. The rear side of each of the said stop-arms is preferably straight. In close proximity to each stop-arm is a paddle holder or arm D.

While the paddle-arm is susceptible of different styles of construction, the preferred form of making it is as shown, viz: The forward side of it is curved downward and backward, so as to diminish its frictional resistance to the water through which it moves, and in it a longitudinal slit D² is present. The upper end of this arm D is pivoted to the paddle-beam B by a suitable connection D', preferably such as shown. The paddle E consists of a flat plate of metal slightly beveled at one side, so that its upper edge E' is somewhat larger than its lower edge, substantially as shown in Fig. 5. The slit or recess D² of the paddle-arm closely fits against the upper edge of the paddle. Consequently the recess D² will be larger at its upper edge than at its lower edge.

The paddle E is inserted in the arm D of one of the paddle-beams B by sliding it endwise through the slit in the said arm, and is then inserted in a like manner into that one of the arms D of the other paddle-beam which is in the same vertical plane transverse to the longitudinal axis of the vessel. In this way the paddle will be quite securely held in its place by the securing paddle-arm. An additional protection against the paddle sliding down and out are the bolts F, passed

through the arm and paddle and secured in place by the screw-thread on the bolt engaging a screw-thread in the arm, or by the end of the bolt with a nut, or forming it with a rivet-head, or in any other well-known manner. The lower end of each paddle E preferably extends a short distance below the lower end of the paddle-arm D.

All of the parts of my device thus far mentioned are preferably made of metal, steel being the preferred description of metal.

The two forward swinging arms of the device are each supported upon a pivot or pivotal connections, the axes of these connections being preferably coincident, and the two rear swinging arms A A are likewise suspended upon pivots or pivotal connections, the axes of the pivots being preferably coincident. The preferred form of such pivotal connection is illustrated in the drawings, and is as follows: The forward swinging arms are at their upper ends each provided with an opening A' of a size sufficient to receive a shaft G. These arms are connected by a sleeve H, whose interior opening is of the same diameter as the opening A' of each swinging arm A, and the axis of the opening in the sleeve H is coaxial with the opening A' of the upper end of the arm A. In this opening in the sleeve and in the openings A' A' in the respective forward swinging arms is present a shaft G. This shaft is fixedly secured to the arms, so that a rotary movement of the shaft will move the swinging arms A as radii of a circle of which the said shaft is the center. The shaft is extended out to one side, as is shown in Fig. 3, and is there provided with a crank-arm I. The rear swinging arms A A are provided with similar openings A' A', and a similar sleeve H is located between the said arms and connected to them, and a similar shaft G passes through the said openings A' A' and sleeve H of the rear swinging arms, the shaft G being fixed thereto. Thus the rear shaft G of the rear arms is extended out at the same side as is the forward shaft G. This rear shaft G is provided with a crank-arm I'. The lower ends of these arms are connected by connecting-rod J, the rear end of the said connecting-rod J being pivoted to the rear lever-arm I and the forward end of the said pitman being pivoted to the rear lever-arm I'. For economy of space and for enabling the pitman K to conveniently operate, the connecting-rod J is pivoted to the inner side of the rear crank-arm I' and to the outer side of the forward crank-arm I. To the lower end of the inner side of the forward crank-arm I is pivoted one end of said pitman K, and the rear end of this pitman K is pivoted to the end of a crank-arm L, connected to a shaft L', upheld in suitable journal-bearing L² and connected to the steam or electric engine or other source of power within the vessel.

The preferred means for supporting the shaft G is as follows: The outer ends of the shaft are extended out and passed through

the beam or supporting-piece M. The outer end of the forward shaft G is journaled in the support M in a journal M' at the front, the outer end of the rear shaft G being similarly pivoted in a corresponding journal M' at the rear in the support M. A beam or support N is located at the inner side of the inner paddle-arms A A, and in it the inner extended ends of the shaft G are respectively journaled in the journals N' N'. These supporting-beams belong to the vessel and are supported from suitable frame-work of the latter. In the case of steamboats the outer beam M may be a part of the outer guard of the deck.

Motion communicated to either of the shafts G would be sufficient to operate the paddles; but I prefer to impart a positive movement from the engine directly to both shafts G. In this way the torsional strain to which either of the shafts G would be subjected were there one employed without the remainder is thereby greatly diminished.

The mode in which my invention operates is as follows: The paddles E E are so hung in relation to the boat that they are always totally submerged, and are preferably submerged to the greatest depth possible consistent with the draft of the vessel. A swinging reciprocal motion is imparted to the beams B. In the present illustrative instance this motion is communicated to the said beams as follows: The steam, electric, or other engine within the boat having been started, a rotary motion is communicated to the shaft L'. This latter shaft, by means of the crank L, imparts a reciprocating motion to the pitman K. The latter in turn reciprocates the lower end of the lever I'. This lever I' imparts to the shaft G a rotary motion. Then, through the agency of the connecting-rod J, a reciprocating movement is imparted to the lever I, which latter in turn communicates a reciprocal movement to the rear shaft G. The movement thus communicated to the shafts G is in turn communicated by them to their respective vertical arms A. The lower ends of the arms A are thereby caused to swing back and forth and to move the paddle-beams B B back and forth with them. As the paddle-beams B B are advanced the resistance of the water causes the paddles to assume a position nearly horizontal, as shown by dotted lines in Fig. 1. While in this position the paddles are moved forward through the water with a minimum amount of force. After the beams B B, with arms A, have reached the forward limit of their reciprocal movement and are beginning to move backward toward the stern of the vessel the resistance of the water causes the paddles E, with their arms D, to immediately assume the vertical position shown by solid lines in Fig. 1. While the backward movement of the paddle-beams is taking place the paddles are prevented from moving out of the vertical position shown in Fig. 1 by means of the stop lugs or arms C C, hereinbefore de-

scribed, for the reason that the paddles and their arms D impinge against the said stop-arms, and are thereby prevented from moving out of the vertical. The paddles are now
 5 in a condition where they will offer the maximum resistance to the water, and in consequence thereof as they are moved backward they impel the boat forward. As soon as the
 10 paddles and their paddle-beams have reached the farther limit of their backward movement and are beginning to advance forward they will immediately assume the position shown by dotted lines in Fig. 1. Thus at each forward movement of the paddle-beams the paddle
 15 will lie horizontally and at each backward movement thereof they will be vertical. In this way the boat will by a succession of the impulses thus continually imparted to the boat be rapidly impelled forward.

20 My invention is simple of construction and economical of cost. It will not easily get out of order, and is very durable, being made of iron and steel. It is well fitted to withstand injurious blows and shocks. The maximum
 25 amount of the force exerted to impel the boat forward is utilized by my invention.

While the various features of my invention are preferably employed together, one or more of said features may be used without the remainder, and in so far as applicable one or
 30 more of said features may be employed in connection with paddling devices other than the one herein specifically set forth.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The reciprocating horizontal beam B, at each end suspended to the adjacent oscillating arm A and carrying a paddle E, secured to arms D, at their upper end pivoted to their
 40 respective beams B, and the stop C, extending down beneath the beam B and opposite to the arm D, substantially as and for the purposes specified.

2. The combination of the reciprocating horizontal paddle-beams B, provided with stop-arms C, and the paddles E, secured to arms D, whose upper ends are pivotally connected to the beams B, substantially as and
 45 for the purposes specified.

3. The reciprocating paddle-beams provided with stop-arms C, and the paddle-arms D, pivoted to the said paddle-beams and provided with the slit or recess D², larger at the inner end than at the outer, and the paddle-
 50 beams having beveled sides larger at their upper edge than at the lower portion, the upper inner portion of said paddle being located within the said slit, substantially as and for the purposes specified.

4. The paddle-beams provided with the vertical stop-arms C, having their forward sides inclined downward and backward, and the

paddles pivotally connected to the said beams at the rear of the respective stop-arms, substantially as and for the purposes specified. 65

5. The horizontal paddle-beams provided with the vertical stop-arms C, having their forward sides inclined downward and backward, and the paddle-arms D, having their forward ends inclined downward and backward and swung beneath the said beams or bars, and paddles E, secured thereto, substantially as and for the purposes specified. 70

6. The combination of the paddle-beams, stop-arms C, having their front sides inclined downward and backward, paddle-arms D, having their forward sides similarly formed and provided with slit or recess D², enlarged at its inner end, and the paddles having their upper edge portions larger than the lower portion and fitted in the said slits or recesses, substantially as and for the purposes specified. 75

7. The combination of the reciprocating arms having vertical stop-arms C, and the paddles E, pivotally connected to the beams immediately in rear of their respective stop-arms, the latter extending down in front of the paddles, swinging arms A, pivotally connected to their adjacent ends of the paddle-
 80 beams and supporting the latter, the said swinging arms being fixed at their upper ends to their respective shafts G G, one or both of the said shafts being connected to the source of power, by which a positive reciprocal motion is communicated to the swinging arms and the beams D and paddles, substantially as and for the purposes specified. 85

8. The combination of the reciprocal horizontal beams, stop-arms C C, paddles E, pivotally connected to the said beams, swinging arms A, shafts G, on which the forward and rear swinging arms respectively oscillate, lever I, fixed to one of said shafts, and pitman K, the free end of the said lever connected to pitman K and the other end connected to the crank L, operating the power-shaft L', substantially as and for the purposes specified. 90

9. The combination of the reciprocal beams, stop-arms C C, paddles E, pivotally connected to the said beams, swinging arms A, shafts G, on which the forward and rear swinging arms respectively oscillate, the lever I, connected to one shaft G, and a similar lever I, connected to the other shaft G, the free ends of one of the levers being rigidly connected to the rod J and the other end connected to the pitman K, operated by the power-shaft L, substantially as and for the purposes specified. 115

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Attest:

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