

(No Model.)

3 Sheets—Sheet 1.

H. BARCROFT.

APPARATUS FOR PROPELLING AND STEERING BOATS.

No. 431,428.

Patented July 1, 1890.

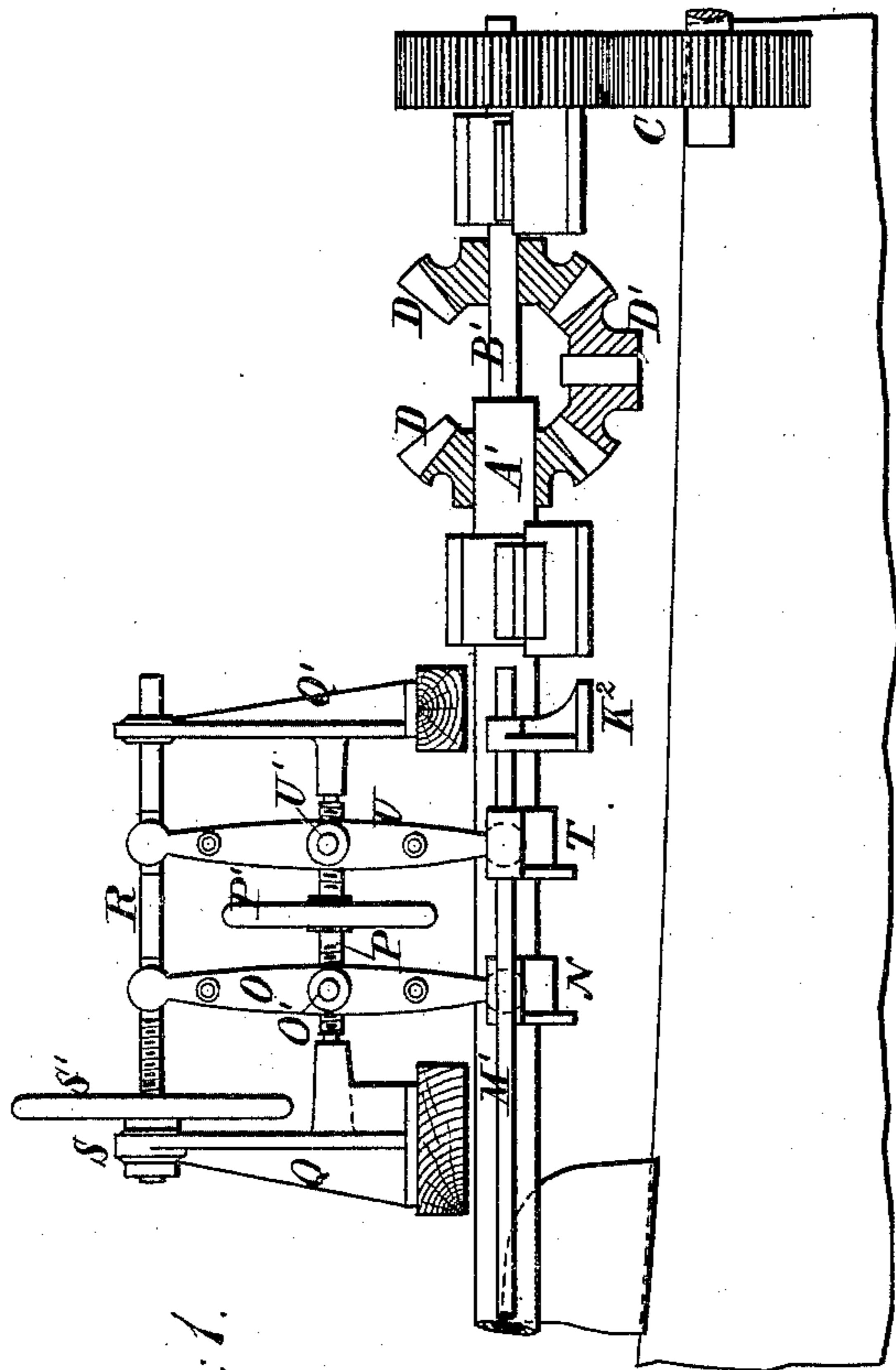
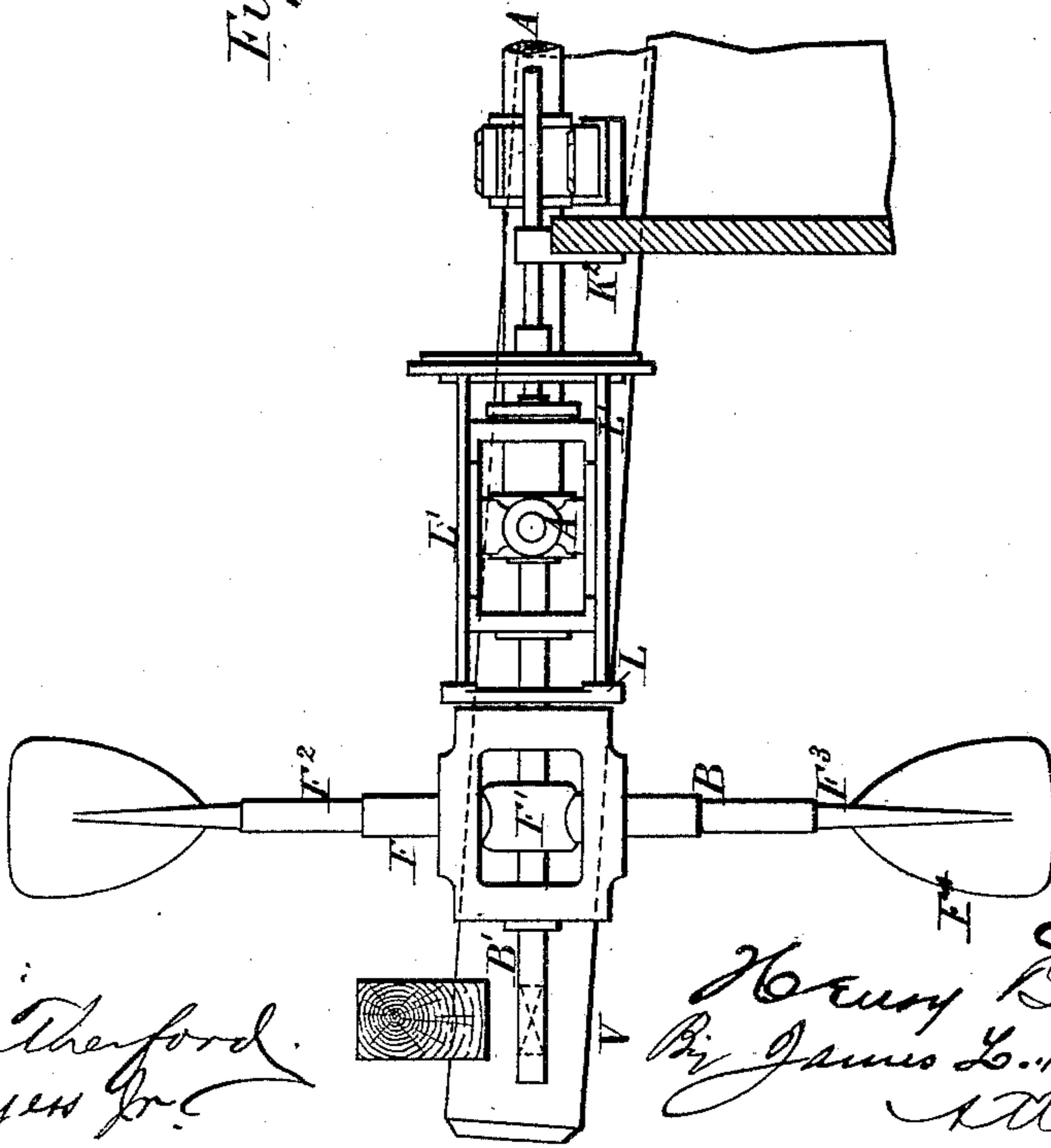


Fig. 1.



Witnesses:
J. A. Rutherford.
J. S. Myers Jr.

Inventor:
Henry Barcroft
By James L. Norris,
Attorney.

(No Model.)

3 Sheets—Sheet 2.

H. BARCROFT.

APPARATUS FOR PROPELLING AND STEERING BOATS.

No. 431,428.

Patented July 1, 1890.

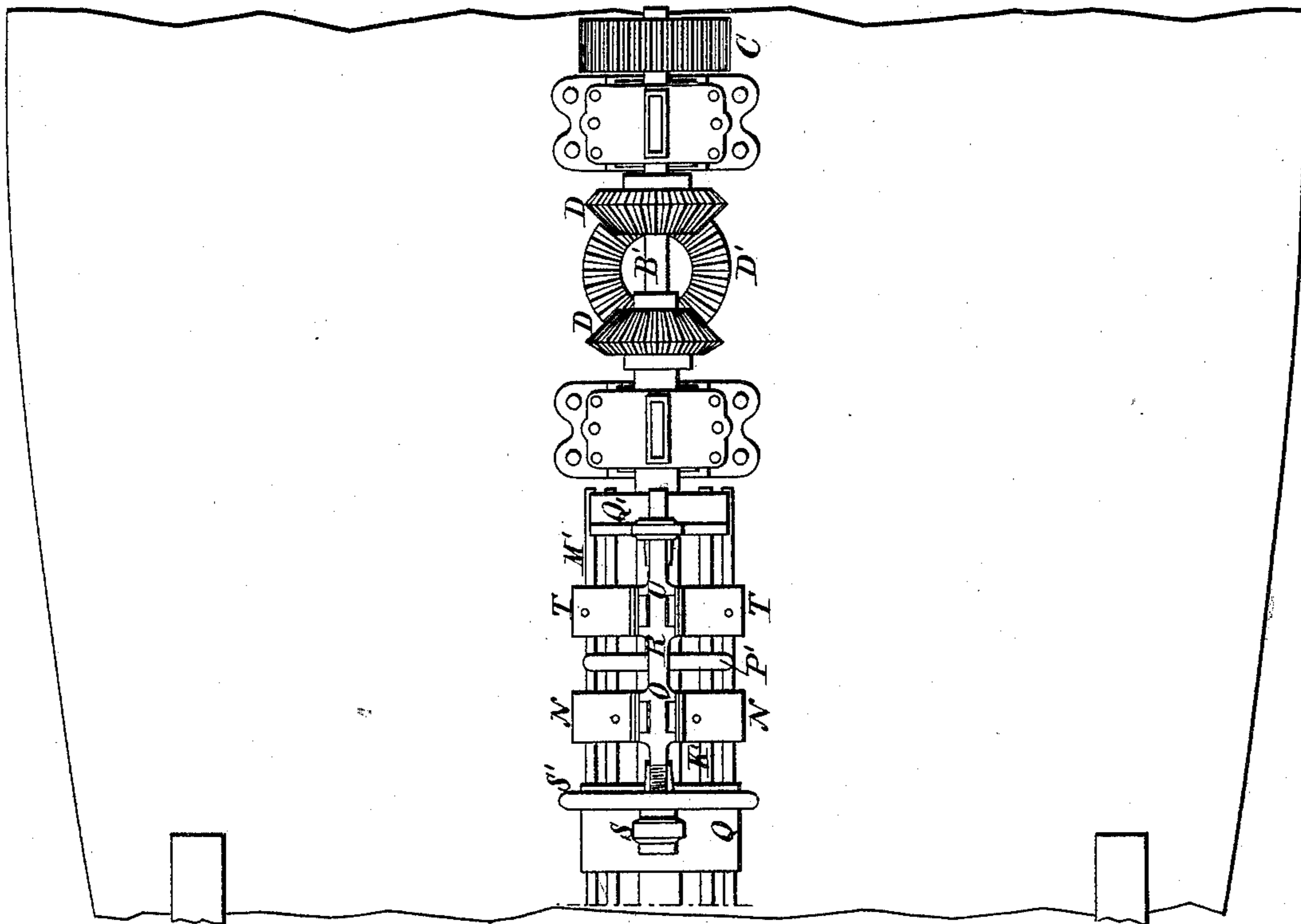
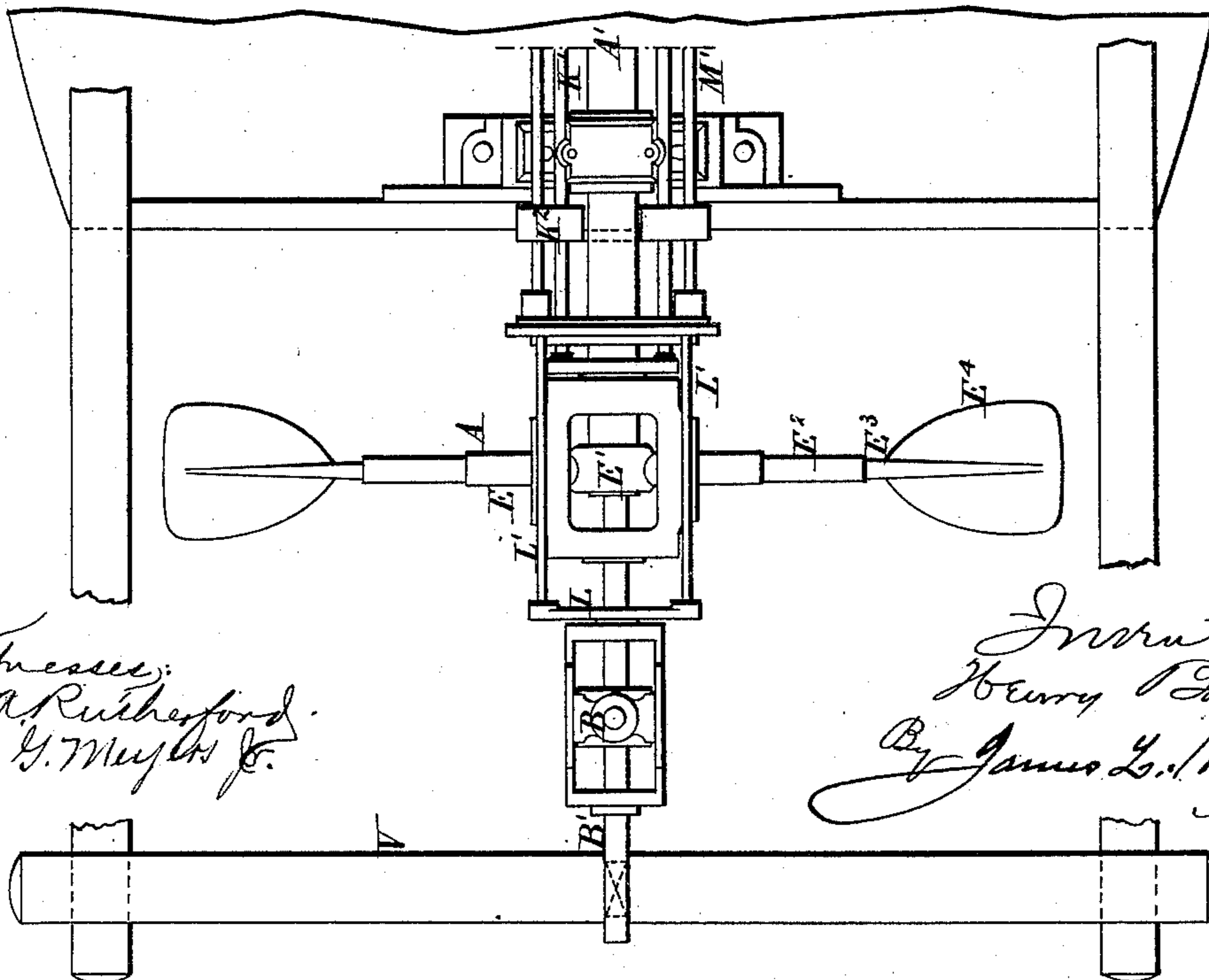


Fig. 2.



Witnesses:
J. A. Rutherford.
J. G. Meyer Jr.

Inventor:
Henry Barcroft
By James L. Norris
Attorney

(No Model.)

3 Sheets—Sheet 3.

H. BARCROFT.

APPARATUS FOR PROPELLING AND STEERING BOATS.

No. 431,428.

Patented July 1, 1890.

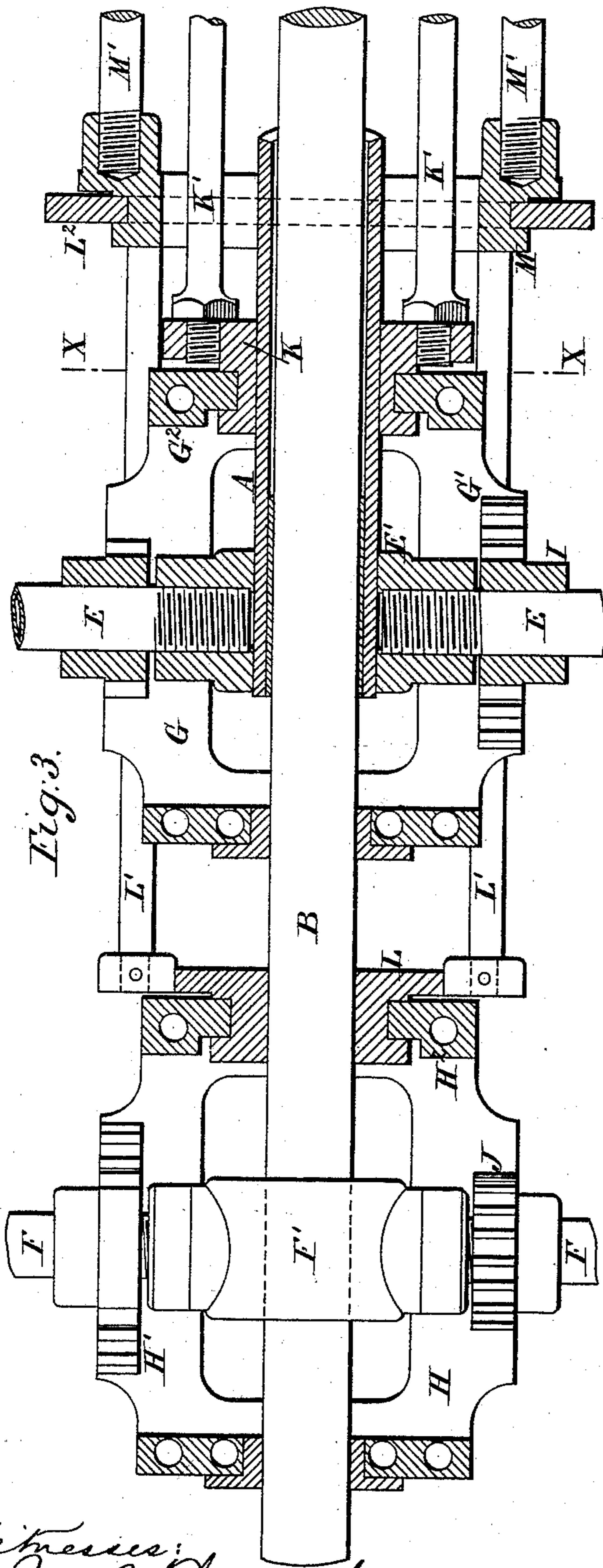


Fig. 3.

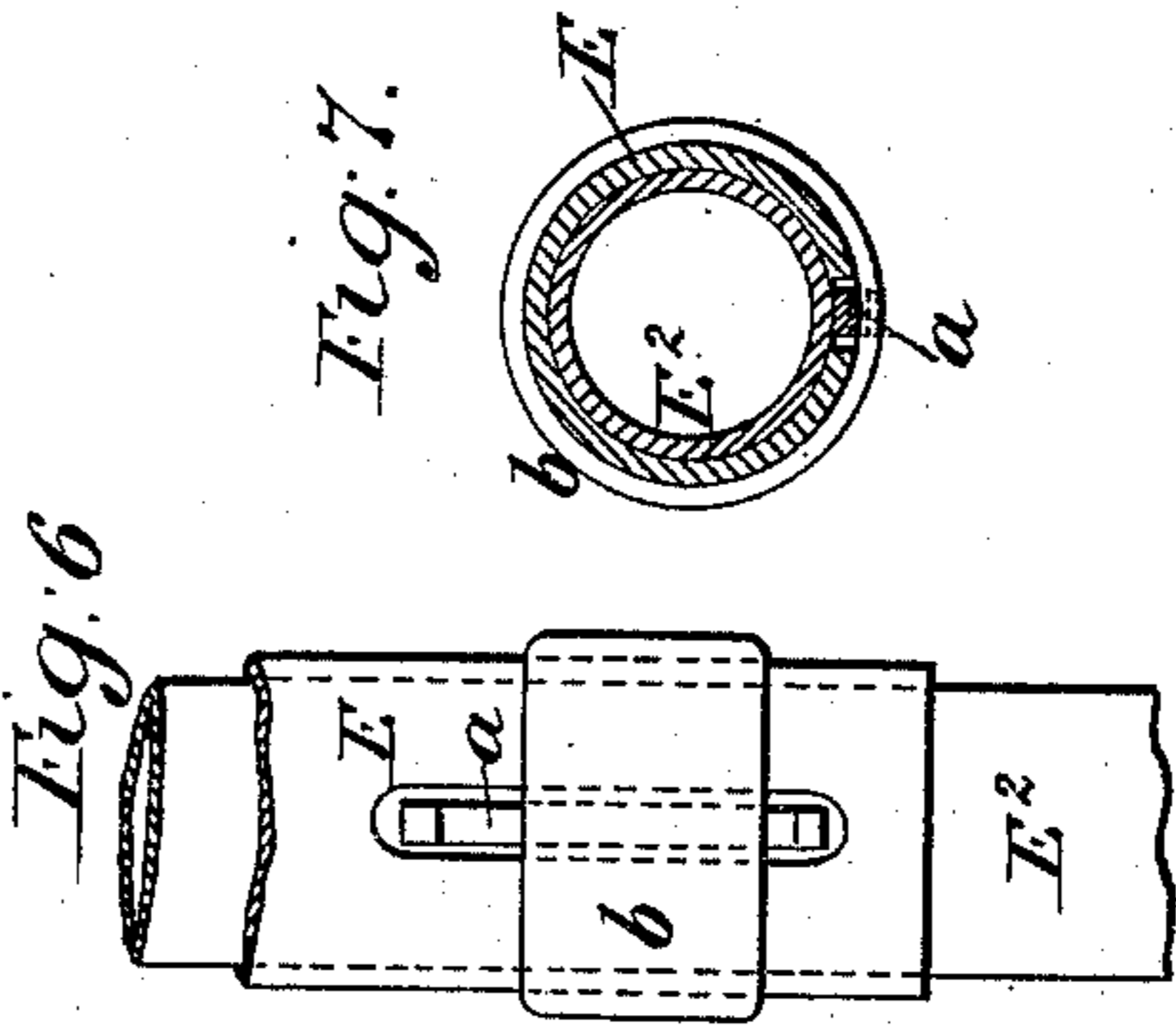


Fig. 6.

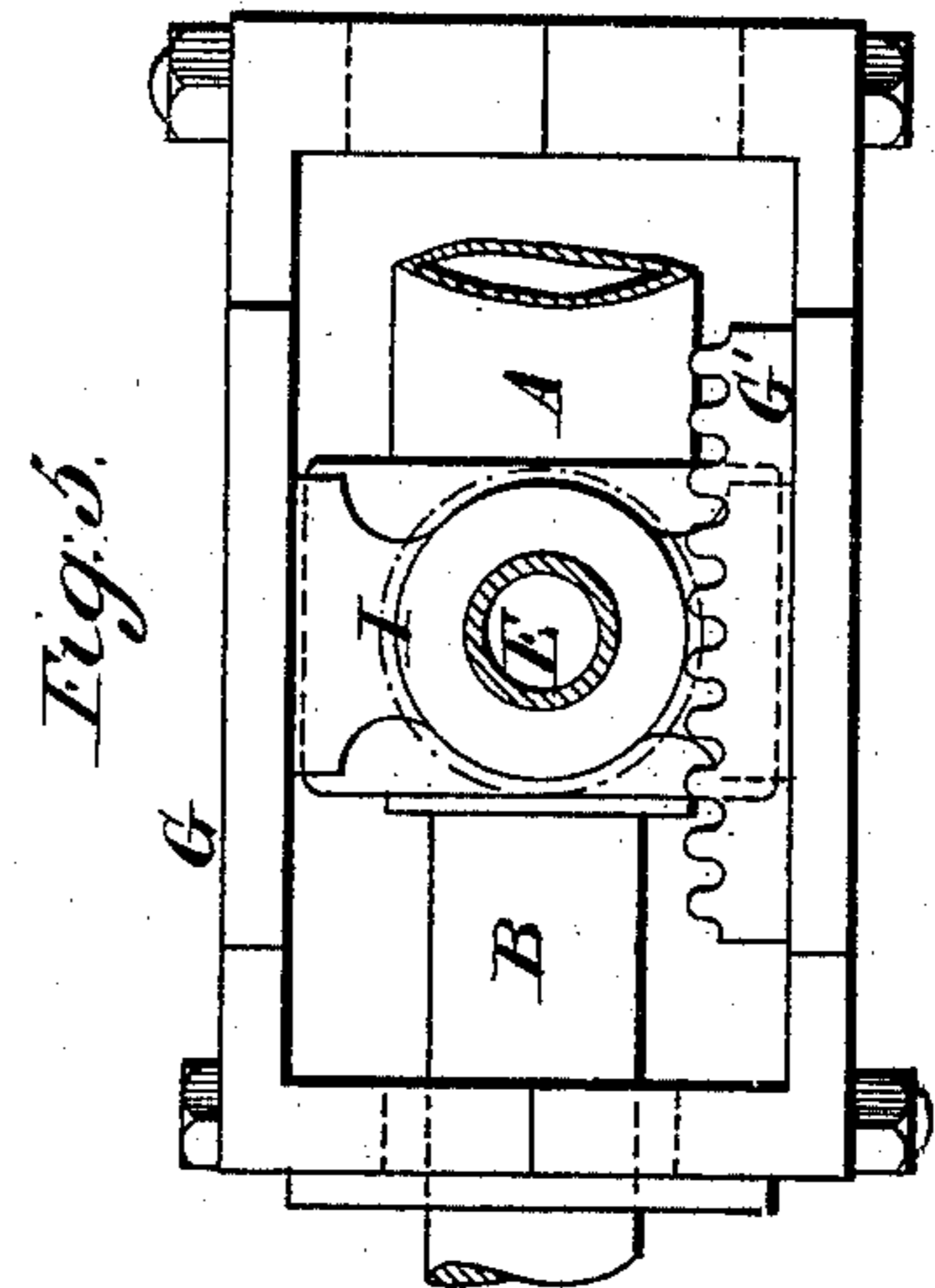


Fig. 5.

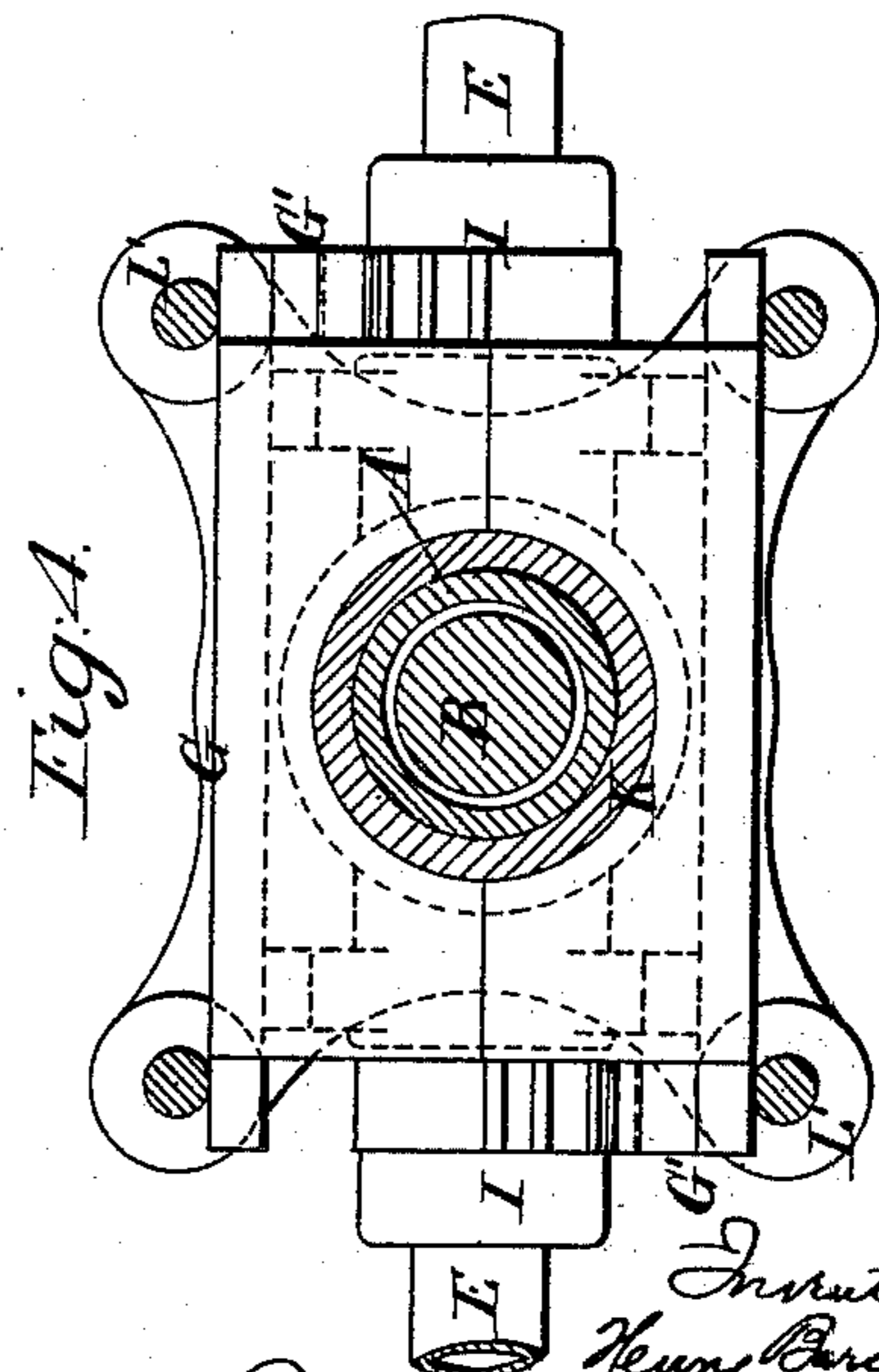


Fig. 4.

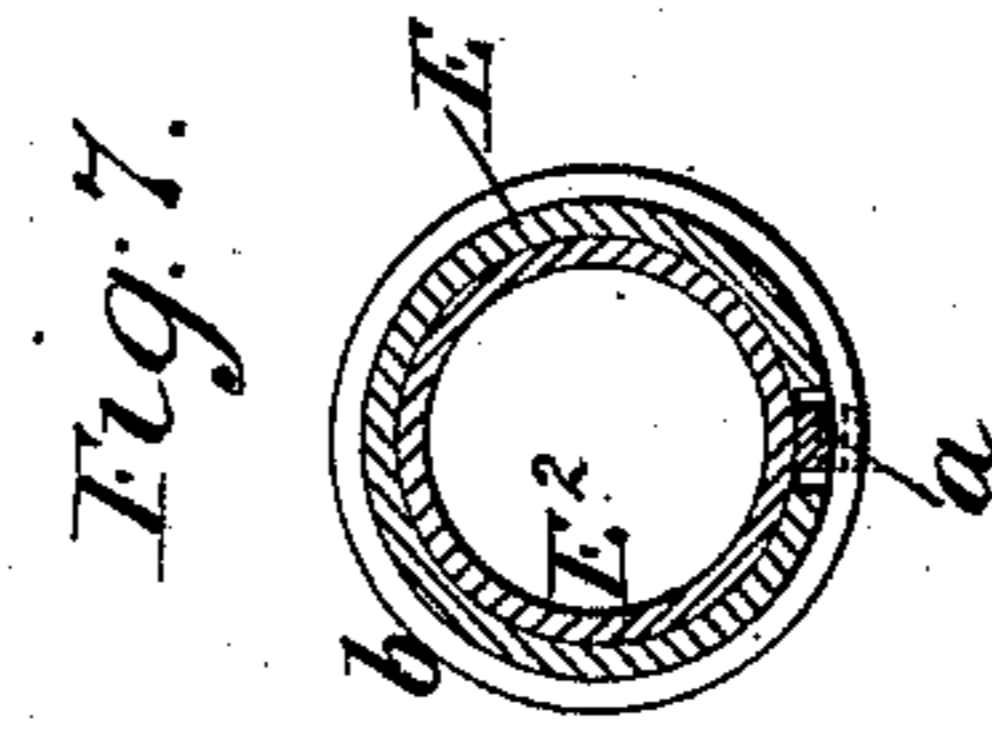


Fig. 7.

Witnesses:
J. A. Rutherford.
J. E. Meyer, Jr.

Inventor:
Henry Barcroft
By James L. Norris,
Attorney.

UNITED STATES PATENT OFFICE.

HENRY BARCROFT, OF NEWRY, COUNTY OF ARMAGH, IRELAND.

APPARATUS FOR PROPELLING AND STEERING BOATS.

SPECIFICATION forming part of Letters Patent No. 431,428, dated July 1, 1890.

Application filed March 22, 1890. Serial No. 344,933. (No model.)

To all whom it may concern:

Be it known that I, HENRY BARCROFT, a subject of the Queen of Great Britain, residing at The Glen, Newry, county of Armagh, Ireland, have invented a new and useful Apparatus for Propelling and Steering Boats and other Navigable Vessels, of which the following is a specification.

My invention has for its object the propulsion of a boat, more particularly a canal-boat, in such a way as not to interfere appreciably with the carrying capacity of the boat, and to do this with a less percentage of loss between the power exerted and that actually expended in moving the boat than has heretofore been attained. In addition to this general object I so construct the apparatus that, in addition to propelling the boat, it will either both steer and vary, stop, or reverse the motion thereof, or will effect the steering of the same only. The propeller-shaft is in all cases arranged on deck or above the water-line, so as to avoid the loss of power inseparable from water-tight bearings, and also the loss which attends the motion of the ordinary submerged boss through the water.

In carrying out my invention I make use of that system of propulsion in which two sets of propeller-blades, mounted on two independent shafts, are rotated in contrary directions, the angle of the blades of the one set being the reverse of that of the other, so that each set counteracts the tendency of the other set to make the boat deviate from a straight course, and I arrange the two sets in such a manner that either the angles of the blades of both sets can be simultaneously increased or decreased to the same extent, or even reversed, whereby an increase or decrease of speed, stopping, and backing can be effected, or the angle of the one set of blades can be made to differ from that of the other, whereby the side-thrust exercised by the one set being greater than that of the other the steering of the boat will be effected. With this arrangement the great advantage is obtained that a motor can be employed under control of a governor which shall run continuously at a constant speed in one and the same direction, thus obviating the difficulty heretofore experienced in employing motors—such as dynamos or oil or gas motor engines—owing to

the difficulty or loss of useful effect in working them at variable speeds or stopping and starting them.

The arms carrying the propeller-blades are by preference made telescopic, so that the propeller-blades can be accurately adjusted to suit varying water-levels, according to the varying draft of the boat.

In order that my invention may be readily understood, I will now proceed to describe, by way of example, one of the various arrangements by which it can be carried into effect, for which purpose I will refer to the accompanying drawings.

Figure 1 is a sectional elevation of the propeller mechanism, showing also a portion of a boat. Fig. 2 is a top plan view of the same. Fig. 3 is a longitudinal sectional view, on a larger scale, showing the mechanism for varying the angles of the propeller-blades. Fig. 4 is a sectional view taken on the line $x x$, Fig. 3. Fig. 5 is a detail side view. Fig. 6 is a detail side view of a device for securing a propeller-arm in its adjusted position. Fig. 7 is a transverse sectional view of the same.

In Figs. 1 and 2 the one set of propeller-blades A is mounted upon a tubular shaft A', and the other set B is mounted upon a solid or tubular shaft B', passing through A'. The shaft B' is driven by a suitable motor-engine through gearing C, while shaft A' is driven in the contrary direction by B', through the bevel-gearing D D and intermediate wheel D'. The blades of the propellers A and B having opposite angular positions imparted to them, it will be seen that in driving them at the same speed in opposite directions the side-thrust exercised by the one set will counteract that exercised by the other set, and they will propel the boat straight ahead. The two sets of propeller-blades are capable of having their angles varied, either to the same extent, for slowing, stopping, or backing, or to a different degree, so as to render the side-thrust of the one set greater than that of the other, and thus effect the steering of the boat. For this purpose the propellers have combined therewith mechanism, part of which is shown more clearly to an enlarged scale in Figs. 3, 4, and 5. The propeller-arms E E F F of the two sets are screwed into their bosses E' F' by means of loosely-fitting screw-threads, so

that the arms are free to turn in their boss through the required angle for bringing the blades either parallel to the plane of rotation, in which case they have no propelling-
 5 power, or to the extreme angle on either side of that position for exercising the greatest propelling-power. The partial rotation of the arms for this purpose is effected as follows: Upon the shaft A is a sliding frame G, and
 10 on the shaft B is a sliding frame H. These frames have toothed racks G' H' fixed on them, which gear with toothed pinions or quadrants I J, fixed on the propeller-arms, so that by shifting the frames in one di-
 15 rection or the other they effect the partial rotation of the arms, as described. The frame G has a collar G² embracing a circular neck on a piece K, capable of sliding on the shaft A, and to which are fixed two rods K',
 20 passing along parallel to the shaft and carried in suitable guides K². The frame H has a collar H² embracing a circular neck on a piece L, capable of sliding on the shaft B, and to which are fixed the rods L', whose other
 25 ends are fixed to a ring L², fitting a circular neck on a sliding piece M, to which are connected rods M', passing along parallel to the rods K' and carried in the guides K². To the rods K' are attached bosses N N, with which
 30 gears the lower end of a double-ended lever O, pivoted at O' to a screw-threaded nut on a screw-spindle P, carried by uprights Q Q', and fitting with its upper forked end between
 35 uprights Q Q', and screwing with a threaded end into a screw-nut S, held in the upright Q, and rotatable therein by a hand-wheel S'. To the rods M' are attached bosses T T, with
 40 which gears the lower end of a double-ended lever U, pivoted at U' to a second screw-threaded nut on the spindle P, and fitting with its upper forked end between other lugs on the bar R. The screw-threads of the spindle P, on which are the nuts of levers O U,
 45 are of reversed pitch, and the spindle can be rotated by the hand-wheel P'.

From the above-described arrangement it will be seen that if it be desired to simultane-
 50 ously alter the pitch or inclination of the blades of both sets of propellers A and B, for either slowing, stopping, or reversing, this can be effected by rotating the screw-spindle P so as to move the nuts carrying the levers O U nearer together or farther apart. By this
 55 movement the lower ends of the levers, and consequently the bosses N T, rods K' M', and sliding frames G and H are moved in contrary directions, thereby also turning the propeller-arms E F through equal angles in
 60 contrary directions by means of the racks G' H'. If on the other hand it be desired to alter the pitch of the one set of blades relatively to the other, so as to steer the boat either to port or to starboard, this can be ef-
 65 fected by rotating the nut S so as to shift the bar R in one direction or the other, thereby moving the upper ends of the levers O U

simultaneously in the same direction, and consequently also shifting the rods K' M' and sliding frames G H in the same direction, 70 whereby the racks in turning the propeller-arms in the same direction will cause the pitch of the one set of blades to be increased and that of the other set decreased.

It will be seen that as the frame G can re- 75volve independently of the piece K, held by the rods K', and as the rods L', which are carried round by the frame G, can revolve independently of the frame H on the one hand and the piece M on the other hand, the 80 above-described actuation of the propeller-arms can be effected while the two sets of propellers are revolving in contrary direc-
 tions.

Instead of effecting the partial rotation of 85 the propeller-arms by racks and pinions, as described, it might obviously be effected by a suitable lever-connection between the slides and the arms. It is also obvious that only the lever O might be used for working the rods 90 K' M' simultaneously for steering the boat only, the slowing, &c., being effected by the motor. The overhanging propeller-shafts are supported in bearings on a suitable overhang-
 ing framing V. 95

The propeller-arms are made telescopic, so that their length can be adjusted according to the draft of the boat or to the depth of immersion required for the blades. The tu-
 100 bular part E F screwed into the boss has for this purpose either a second tubular part E² F² sliding in it, in which again slides the tubular or solid stem E³ F³, formed in one with the blade E⁴ F⁴; or the stem of the blade may slide directly in the tubular part E. By 105 this arrangement both the length of the propeller-arm and the angular position of the blade can be accurately adjusted, as the stem of the blade is free to turn in the tubular part. The sliding part or parts of the arm 110 can be secured in the position to which they are adjusted by any suitable known means, a convenient arrangement being that shown at Figs. 6 and 7. The tubular part E has a
 115 slot cut in it, through which a key a, having a head at both ends, passes, so as to bear against the part E², the key being held in a strap b, fixed to E, so that on driving the key in one direction the parts E and E² are firmly
 120 secured together, while on driving the key in the contrary direction E² is free to slide in E.

The propeller-blades and gear may be in-
 closed above water-line by a suitable casing.

Having thus described the nature of my invention and the best means I know for car- 125rying the same into practical effect, I claim—

1. The combination, with a boat or vessel, of two independent shafts located thereupon above the water-line, two sets of axially-ad-
 130 justable propeller-blades mounted, respectively, on the outer end portions of the shafts, and gearing for axially turning the two sets of propeller-blades to change the angular po-
 sitions for varying, stopping, or reversing the

motion of the vessel or steering the latter, substantially as described.

2. In apparatus for propelling boats, the combination of two sets of rotary propeller-blades mounted on independent shafts above the water-line, the arms of the propeller-blades being rotatable in their bosses, sliding racks geared with pinions or toothed segments on the propeller-arms, and sliding frames carrying said racks connected to each other and to actuating-rods by revoluble connections, so that the said rods can impart longitudinal motion in either direction to both frames and racks, so as to turn the propeller arms and blades into different positions, while at the same time the one set of blades, with its sliding frame and racks, is rotating in one direction, and the other set of blades, with its sliding frame and racks, is rotating in the contrary direction, substantially as herein described.

3. An apparatus for propelling boats, consisting of two sets of rotary propeller-blades mounted on independent shafts above the water-line, the arms of said propeller-blades being revoluble in their bosses, sliding frames carrying racks gearing with teeth on the propeller-arms, said frames being connected together, but capable of independent rotary motion, rods connected to said sliding frames for imparting longitudinal motion thereto, the frames being capable of rotary motion independently of said rods, and levers connected to said rods, having their fulcrum on nuts on a right and left handed screw-spindle and connected to a bar, by which they can be

moved simultaneously in either direction, substantially as and for the purposes set forth.

4. In combination with two sets of propeller-blades on independent shafts, adapted to revolve in opposite directions, the arms of the blades being adapted to turn in their bosses, rods connected to devices for turning the said arms so as to cause the blades to assume different angles, and levers connected to the said rods so as to move them either in the same direction or in opposite directions, according as the angles of the one set of blades requires to be made different from that of the other set, or as both sets require to be adjusted to the same angle, substantially as and for the purposes described.

5. In combination with two sets of propeller-blades on independent shafts, situated above the water-line and adapted to revolve in contrary directions, telescopic arms carrying the said propeller-blades, so as to adjust the length of the arms according to the draft of the boat, means being provided for securing the parts of the telescopic arms in the position to which they are adjusted, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of March, A. D. 1890.

HENRY BARCROFT.

Witnesses:

MACARTHY COURDT,

Solr., Newry.

SIMON F. HAURALLY,

Solr.'s apprentice, Newry.