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PATENTED DEC. 29, 1903.

J. S. WORCESTER.
PROPELLING DEVICE FOR BOATS.

APPLICATION FILED APR. 7, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

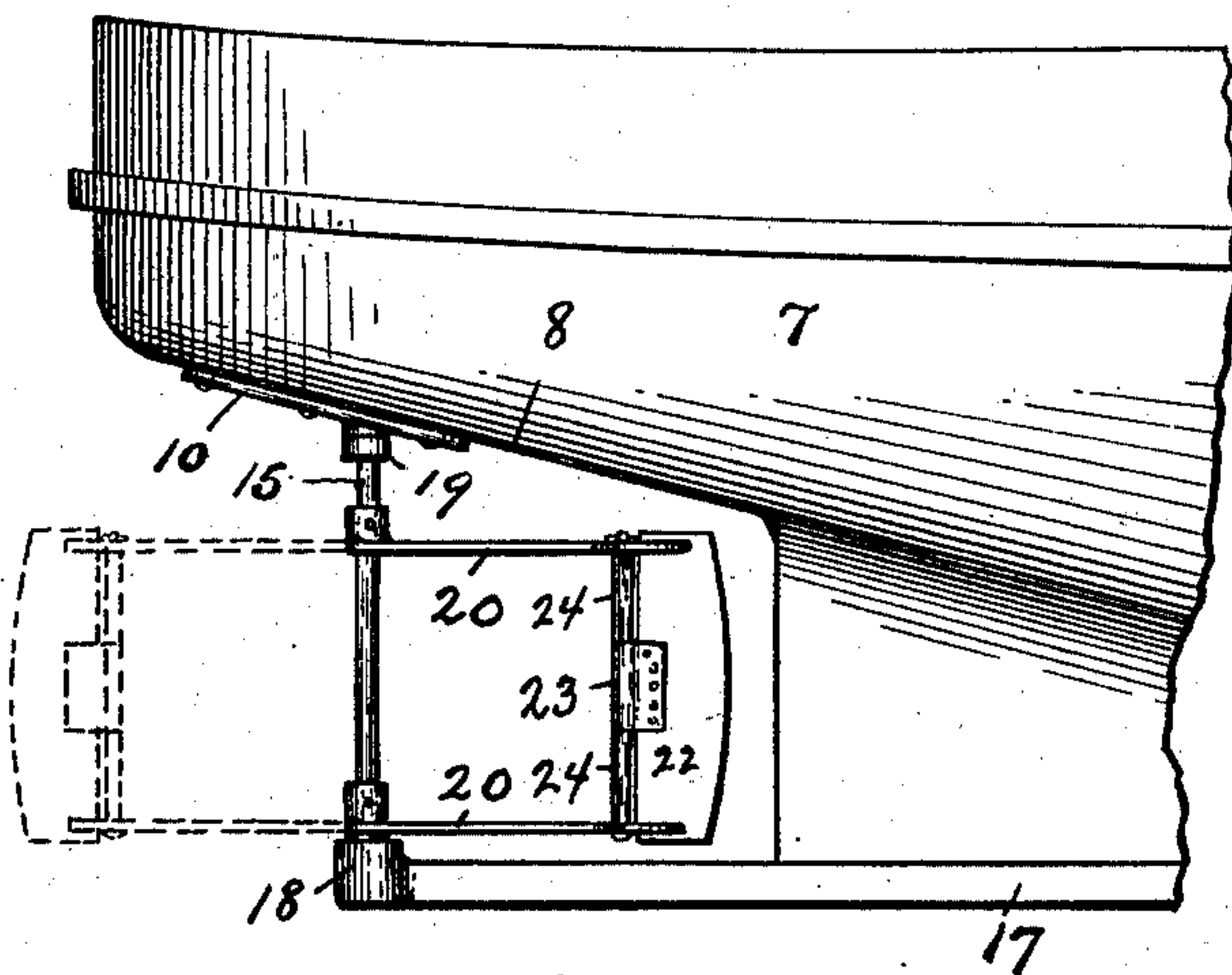
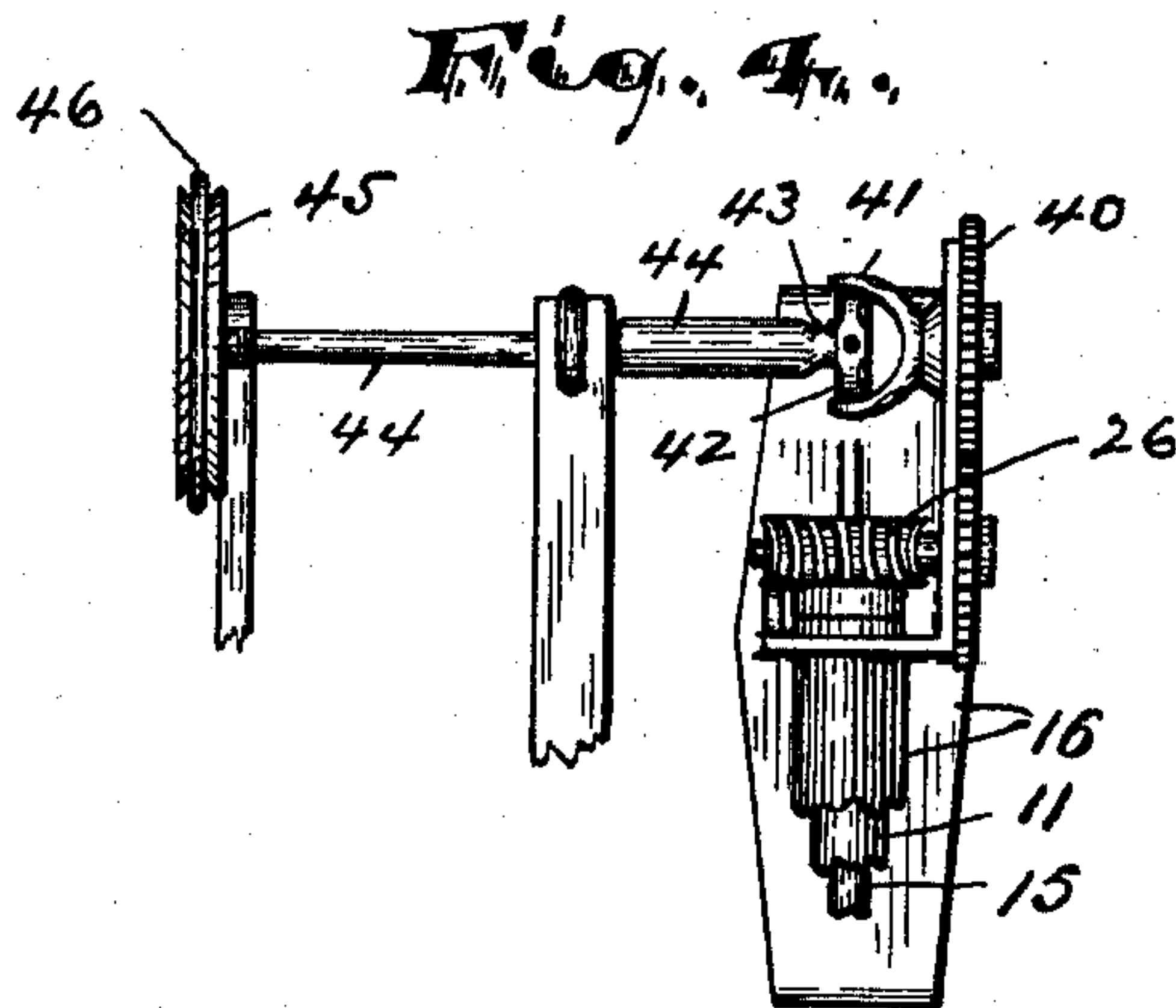
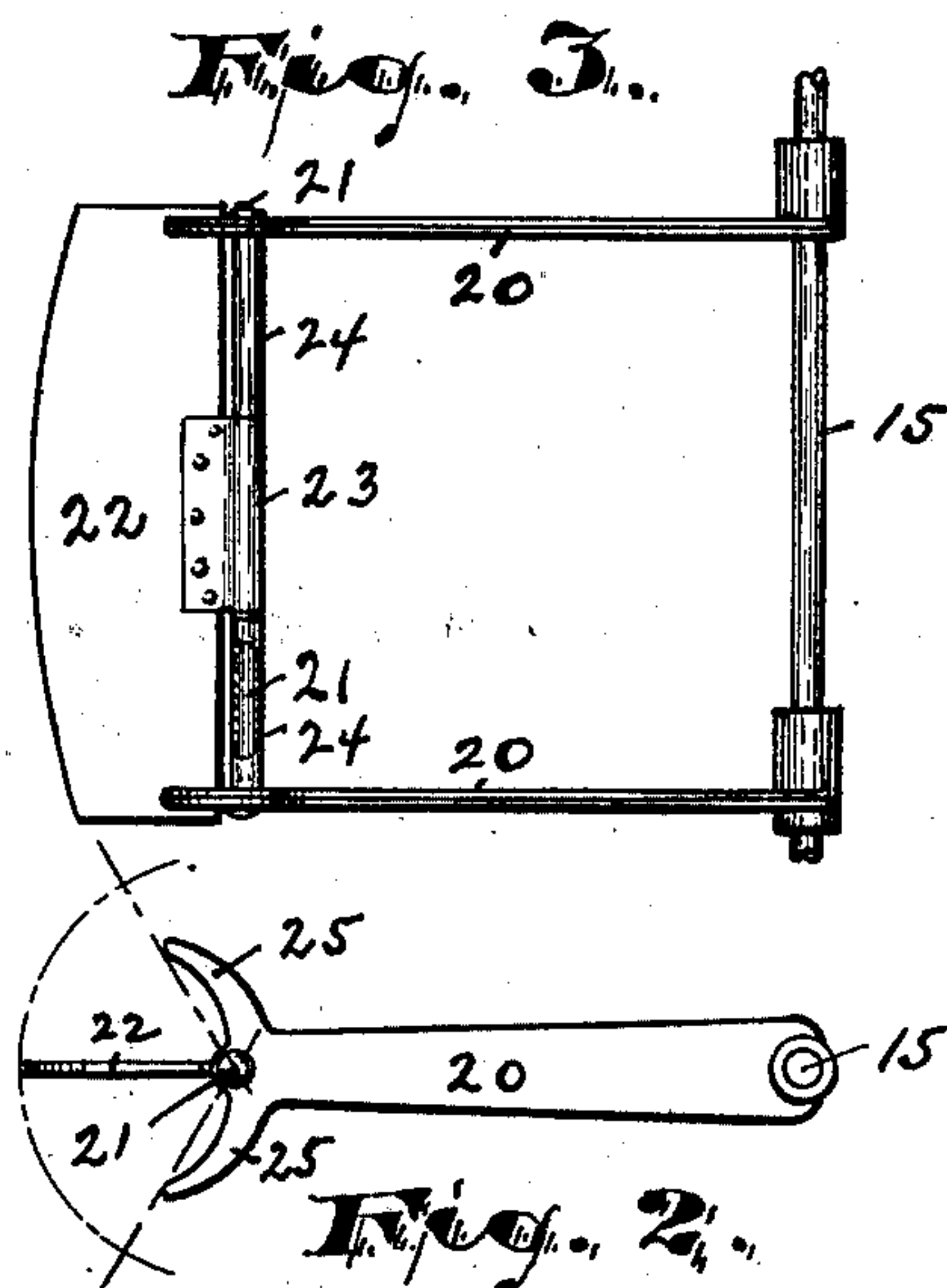


Fig. 1.



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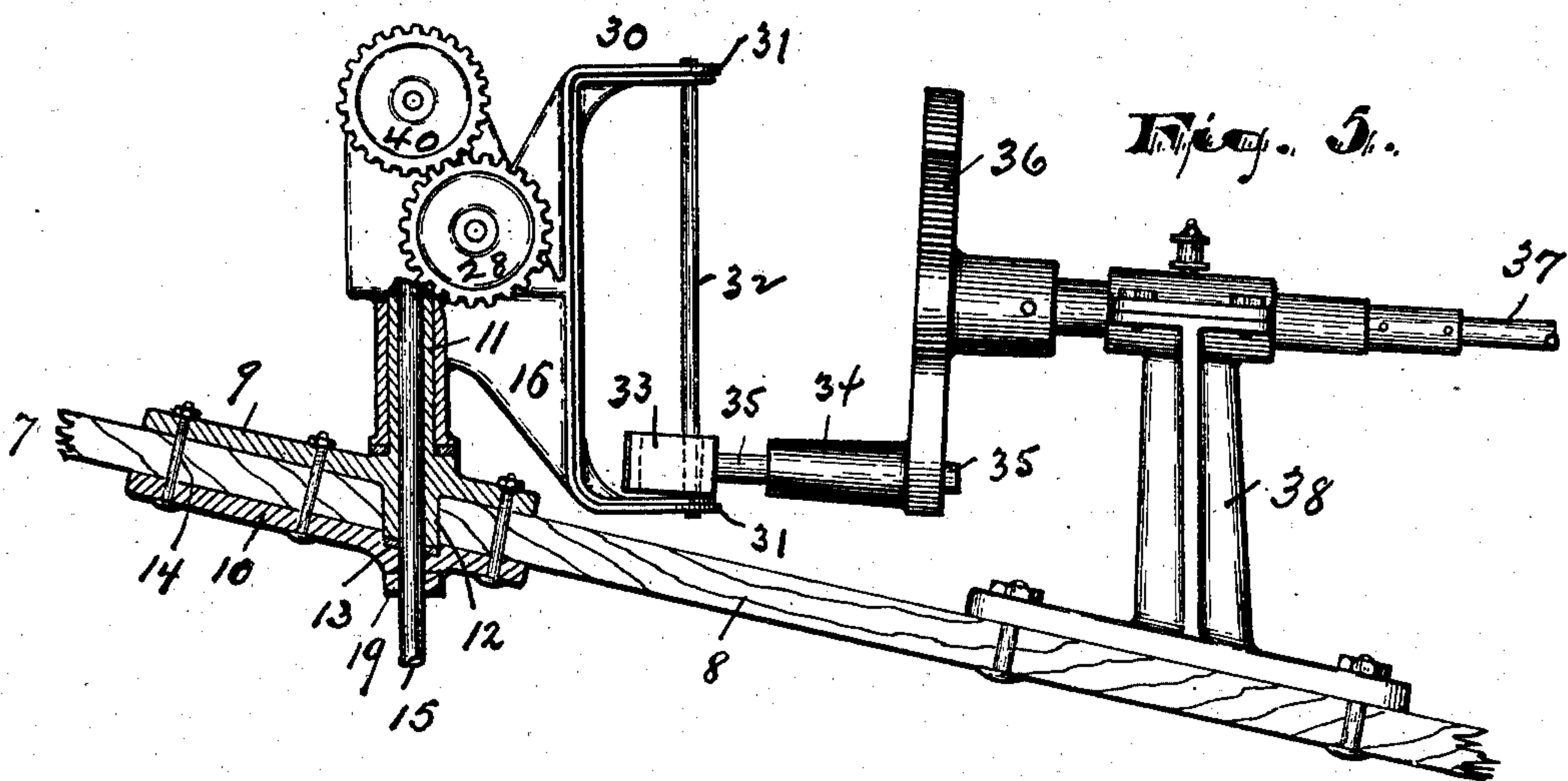
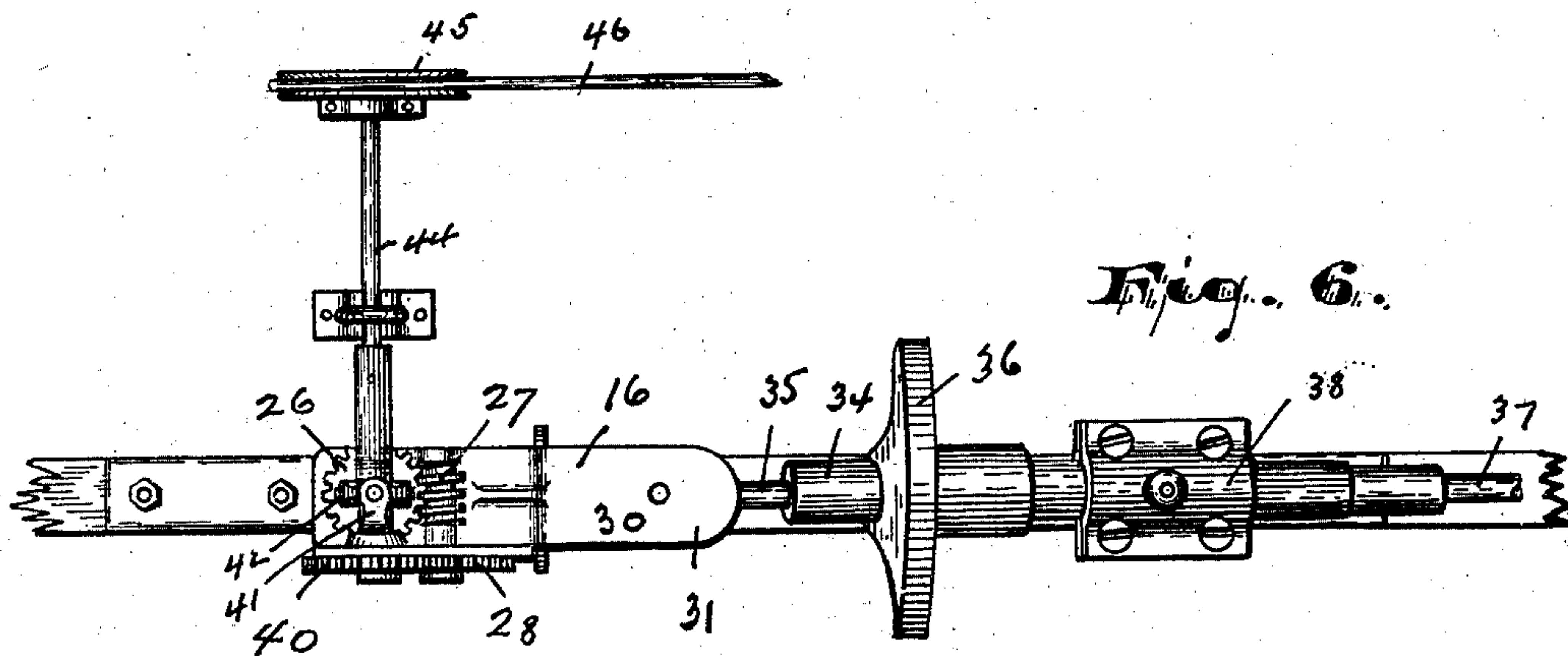
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2 SHEETS—SHEET 2.

Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES S. WORCESTER, OF NEWARK, NEW JERSEY.

PROPELLING DEVICE FOR BOATS.

SPECIFICATION forming part of Letters Patent No. 748,453, dated December 29, 1903.

Application filed April 7, 1903. Serial No. 151,437. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. WORCESTER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented and produced a new and original Improvement in Propelling Devices for Boats; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The objects of this invention are to secure increased speed with a given expenditure of power; to reduce the concussion or jarring effect upon the boat as the latter is forced through the water, the concussions being due to the vibrations and oscillations of the propelling devices; to obtain a more regular and smooth sailing of the vessel; to reduce the cost of construction, and to secure various other advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved propelling device for boats and floating vessels and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of the stern portion of a boat to which my improvements have been applied. Fig. 2 is a detail plan of a propelling-blade and its supporting arm or carrier. Fig. 3 is a detail side elevation of the same. Fig. 4 is a detail view showing a portion of the steering-gear, showing the same in rear elevation. Fig. 5 is a side elevation showing the interior portions of the propelling devices. Fig. 6 is a plan of the same, and Fig. 7 is a transverse section of one of the blade-supporting arms.

In said drawings, 7 indicates the hull of the boat, the stern of which projects rearwardly at a point above or at the water-line,

so as to form beneath the projecting or overhanging portion of the stern an aperture or recess in which the propelling-blade and its supports or carriers are free to operate.

In the inclined or approximately horizontal flooring 8 of the overhanging portion of the boat are arranged bearings for the blade-operating shaft. Said bearings are preferably in the particular part which is sometimes called the "stern-post," disposed at the longitudinal center of the stern portion of the hull. The said bearings 9 10 clamp on the inner and outer sides of the flooring, as shown clearly in Fig. 5, the inner bearing 9 being provided with tubular extensions 11 12, the first of which extends upward to a point preferably above the water-line and serves as a pivotal post or bearing for a swinging or horizontally-oscillating frame 16, hereinafter referred to. The bearing-plate 9 is also furnished with a downward vertical extension 12 shorter than the first above referred to, and which fits within a perforation in the flooring or hull 9 and preferably enters a socket 13, formed in the lower plate-like portion of the bearing 10, the said extension 12 and socket 13 and the contiguous parts being coated with thick white lead to secure impermeability and secure against leakage.

The plate-like parts of the bearings 9 10 are strongly bolted together and to the hull by means of the bolts 14, thus securing great rigidity and firmness of bearing from the vertical shaft 15 and a rigid and strong pivotal support for the oscillating frame 16.

The keel 17 of the boat is also extended rearwardly and is preferably a casting or forging of suitable structure which provides a bearing 18, upon which the vertical shaft 15 at its lower end is seated, the said vertical shaft being prevented from moving upward out of said bearing by a fixed collar 19 on said shaft or by other suitable means. Between the keel extension and the flooring 8 is arranged on the said shaft 15 two or more arms 20, which are keyed or otherwise fixed upon said shaft, so as to move therewith. Said arms 20 are preferably shaped in cross-section as in Fig. 7, the opposite edges being reduced to a blade-like edge, so as to cut

horizontally through the water with great ease or little resistance, as will be understood.

At the free extremities of the arms 20 is arranged a shaft or rod 21, Fig. 3, which is secured to the said arms by nuts or cotter-pins or any other suitable means, and at a point about midway between the said arms is hinged the propelling-blade 22, having the hinge-eye 23, which may be integral with the blade or otherwise. The said hinge-eye 23 is held at a point midway between the arms by means of tubular sleeve 24, arranged on said shaft or rod 21 either loosely or rigidly. The said sleeves are preferably rigidly secured to the arms 20 or integral therewith, and the shaft or rod 21 is preferably removably arranged in said sleeves. At the free extremities of said arms 20 the same is forked, as shown in Fig. 2 at 25, the prongs of the forks being curved or turned, so as to lie in the path of the propelling-blade, the extremities of the said arms serving as detents in pairs, by which the said propelling-blade is limited in its oscillating movements to an angle of one hundred and twenty degrees, more or less, as indicated in Fig. 2.

The propelling-blade 22 is hinged or pivoted on the shaft 21 at a distance from and eccentric to the shaft 15 and is of flexible and resilient metal adapted to bend slightly when subjected to the resistance of the water, so that when the said blade, bearing at its opposite ends against the prongs 25, is forced through the water by its supporting-arms 20 and the motive means connected therewith the said blade will assume a slightly-curved shape, the concavity being toward the resisting water. The said water will be thus thrust rearward by the blade and at the same time caused to move toward a horizontal center line more or less approximating a line parallel with the keel. By this means there will be but little spray or loose flying particles of water at the stern.

At the upper extremity of the vertical shaft 15 within the hull of the vessel is keyed or otherwise fastened a worm-wheel 26, which meshes with a second worm-wheel 27, journaled upon the frame 16, the worm-wheel being rigid on the shaft 15 and the cooperating worm-wheel 27 being journaled upon and movable with the frame 16. When the said frame 16 is oscillated on the shaft 15 as a center of movement, as hereinafter described, the said shaft 15 will be also oscillated to effect an oscillation of the arms 20, as above referred to. The said frame 16 eccentric to the shaft 15 is provided with a fork 30, the prongs 31 of which provide bearings for a vertical shaft or bar 32, which serves as a slideway for a slotted and sliding head 33 of a crank-pin 34. The said crank-pin 34 is tubular or sleeve-like to receive the shank 35 of the sliding head 33. The crank-pin in turn is formed upon a wheel or balanced plate 36, keyed to or fixed upon the rotary driving-

shaft 37, which last receives its power from an engine or other motor, the said shaft 37 having its bearings on a stud or stand 38 in any suitable manner. Rotary motion being imparted to the shaft 37 by the engine, the wheel or plate 36 is caused to rotate and with it the tubular crank-pin 34. This same rotary motion is imparted to the sliding shank 35, free to move within the said crank-pin. The head 33 of the shank being slotted, the axis of the wheel 36 may be at any inclination without interfering with the free movement, and because of the inclination of the said axis the said shank 35 may move in and out in the line of the longer axis of the tubular crank-pin to prevent jamming. As the crank-pin 34, shank 35, and head 33 turn with the shaft 37 as the center of movement the head 33 is caused to slide vertically on the rod 32 and also to move in the axis of the shank 35, and at the same time the frame 16 is caused to oscillate with the shaft 15 and extension 11 as the centers of movement, and thus to transmit oscillatory motion to the propelling-blade.

The path of oscillation of the free end of the frame 30 is ninety degrees, more or less, and as a result the arms 20 also move in an angle of ninety degrees, more or less, less than the angle in which the movements of the blade 22 are confined for the purposes hereinafter specified.

The locations of the fields or paths of movement of the frame 16 and the arms 20 may be varied at will for steering or changing the direction of the boat.

The worm-wheel 27 is in connection with a cog-wheel or gear-wheel 28, which in turn intermeshes with a gear-wheel 40, journaled upon the upper part of the frame and having a forked arm 41, extending to a point in line with the axis of the vertical shaft 15, and between the prongs of the forked arm 41 is a socketed piece 42, pivoted between said arms 41 and in turn receiving in its socket the ball-like head 43 of a steering-shaft 44, the said shaft being adapted to be turned by a wheel 45 and belt 46, the latter extending to the steering-wheel in the wheel-house of the boat, directly or indirectly in any suitable manner. The forked arms, socketed piece, and ball-like extremity of the shaft 44 may be modified in any suitable manner to secure a universal joint.

While I have described in positive terms the construction of my device, I am aware that various modifications and variations from the detailed construction may be made without departing from the spirit and scope of the invention, and I do not wish to be understood as limiting myself to all the details which I have positively described.

Having thus described the invention, what I claim as new is—

1. The combination, in a propeller for boats, with a flexible blade and means for supporting and operating the same, of detents stationed

at the opposite ends of said flexible blade and adapted to provide limiting-bearings, whereby the said ends of the blade will be held while the said blade is bending or bowing under the resistance of the water, the said blade being pivoted intermediate of said detents and the ends of said blade being free to permit an easy flexure.

2. The combination, in a propeller for boats with a flexible blade and means for oscillating the same, of two pairs of detents, a pair being stationed at opposite ends of the blade to limit the scope of oscillating movement and effect a bowing of the blade when the latter is subjected to the resistance of the water, said blade being arranged on a pivotal shaft of said oscillating means at a point intermediate of said detents and the ends of said blade being free, and tubular sleeves arranged on said pivotal shaft at opposite sides of the pivotal connections of the blade to hold said blade in operative relation to the detents.

3. The combination with the vertical shafts having bearings in the stern of a boat and having horizontally-projecting arms carrying an oscillating blade limited by detents of said arms, of an oscillating frame pivoted in axial line with said shaft and carrying a worm-wheel, a cooperating worm-wheel fixed upon said vertical shaft and intermeshing with the first said worm-wheel, and means for oscillating said frame, substantially as set forth.

4. The combination with the shaft provided with bearings for an oscillating frame, said shaft having a blade attached, which is pivoted at a point eccentric to the axis of said shaft and has a limited movement on its pivots, of an oscillating frame pivoted on its bearings at an axial line concentric with the axis of said shaft, a worm-wheel fixed to said shaft, a second worm-wheel journaled on said frame and intermeshing with the first said worm-wheel, and means for operating said frame.

5. The combination with the shaft provided with bearings for an oscillating frame, said shaft having a blade attached which is piv-

oted at a point eccentric to the axis of said shaft and has a limited movement on its pivots, of an oscillating frame pivoted on its bearings at an axial line concentric with the axis of said shaft, a worm-wheel fixed to said shaft, a second worm-wheel journaled on said frame and intermeshing with the first said worm-wheel, and means for operating said frame, comprising a driving-shaft carrying a tubular crank-pin and a sliding head having a shank adapted to slide longitudinally and turn axially in said tubular crank-pin, substantially as set forth.

6. The combination with the shaft provided with bearings for an oscillating frame, said shaft having a blade attached which is pivoted at a point eccentric to the axis of said shaft and has a limited movement on its pivots, of an oscillating frame pivoted on its bearings at an axial line concentric with the axis of said shaft, a worm-wheel fixed to said shaft, a second worm-wheel journaled on said frame and intermeshing with the first said worm-wheel, and means for operating said frame, comprising a driving-shaft, a wheel or plate fixed thereon and having a tubular crank-pin, a shank sliding and turning in said crank-pin, and having a slotted head sliding on the oscillating frame.

7. The combination with the shaft 15, a bearing on said shaft having a tubular extension and a frame pivoted on said extension and having arms 31, and a shaft or bar 32, of a driving-shaft 37, having a plate or wheel 36, having a tubular crank-pin and a slotted head arranged on said shaft or bar, and having a shank movably arranged in said crank-pin and means for transmitting motion from the frame to said shaft 15, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of March, 1903.

JAMES S. WORCESTER.

Witnesses:

CHARLES H. PELL,
C. D. PITNEY.