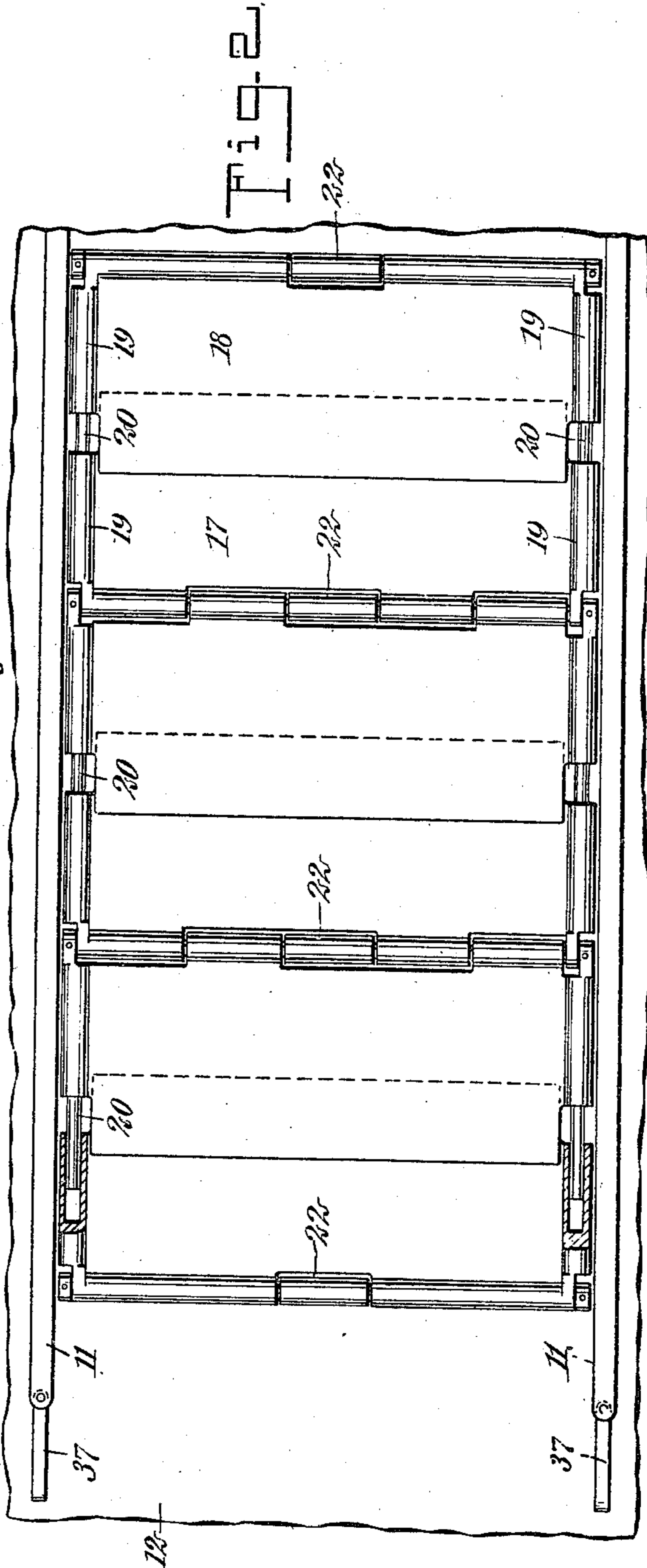
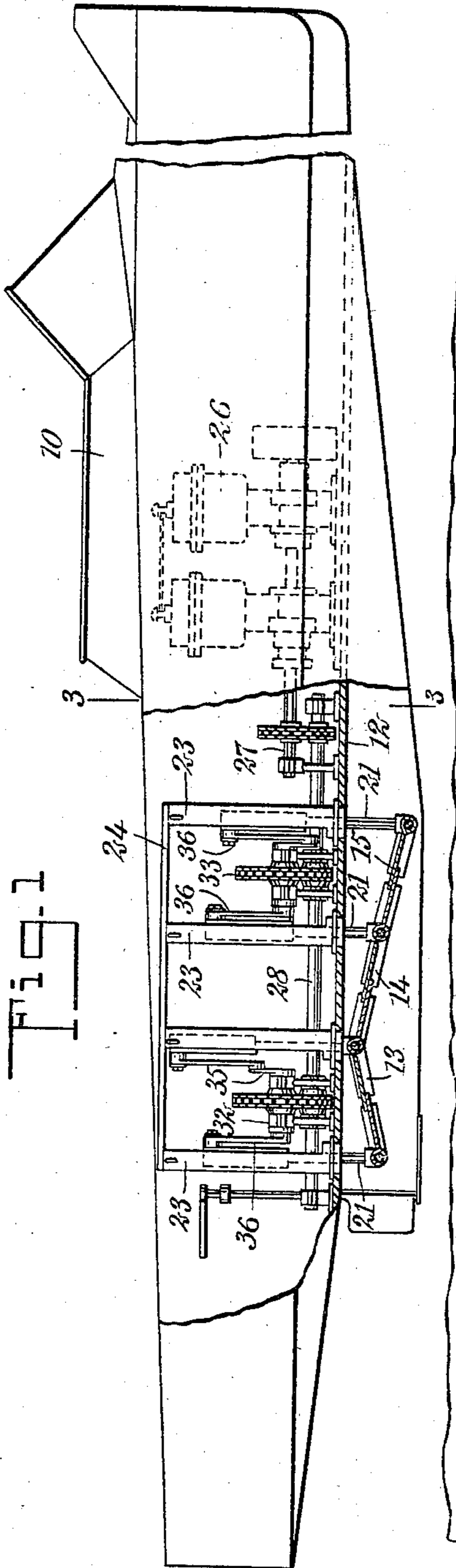


J. TURNER.  
PROPELLER.

APPLICATION FILED JULY 17, 1907. RENEWED OCT. 14, 1908.

966,491.

Patented Aug. 9, 1910.  
2 SHEETS—SHEET 1.



WITNESSES

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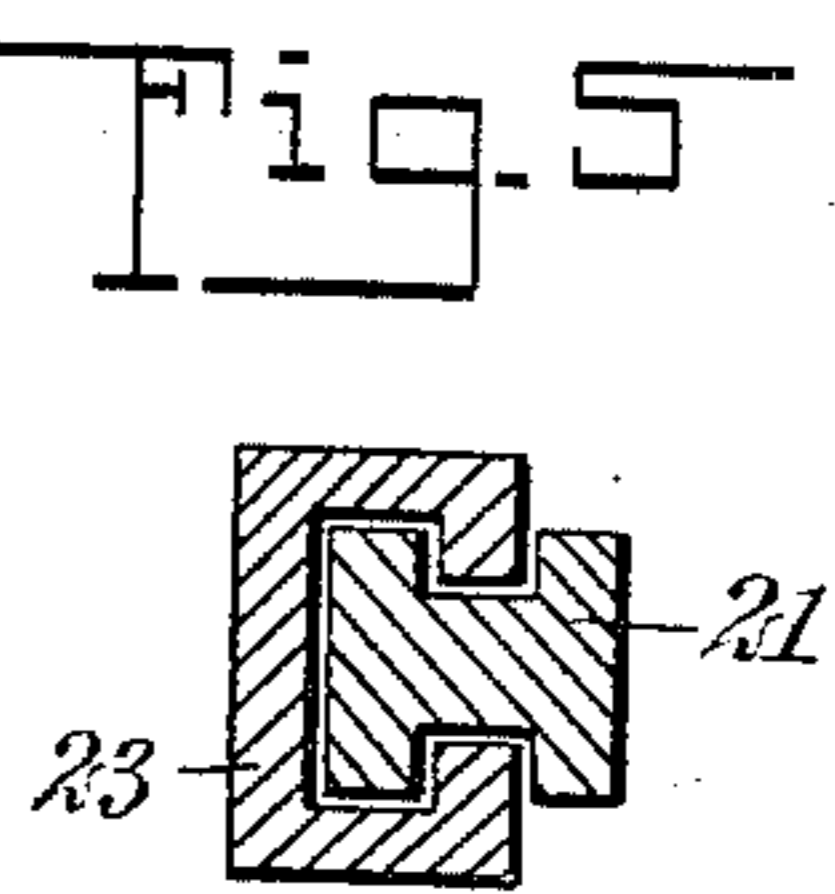
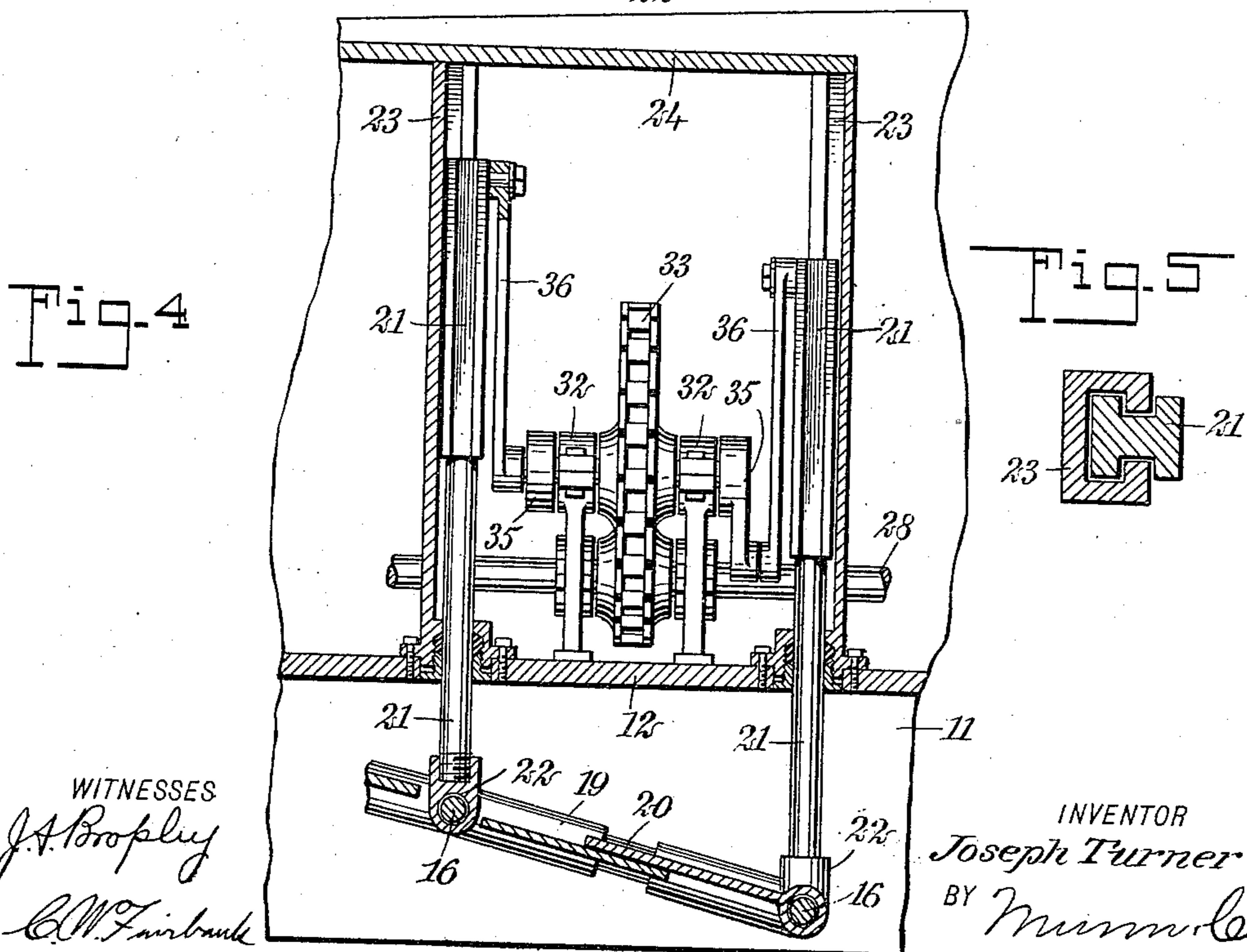
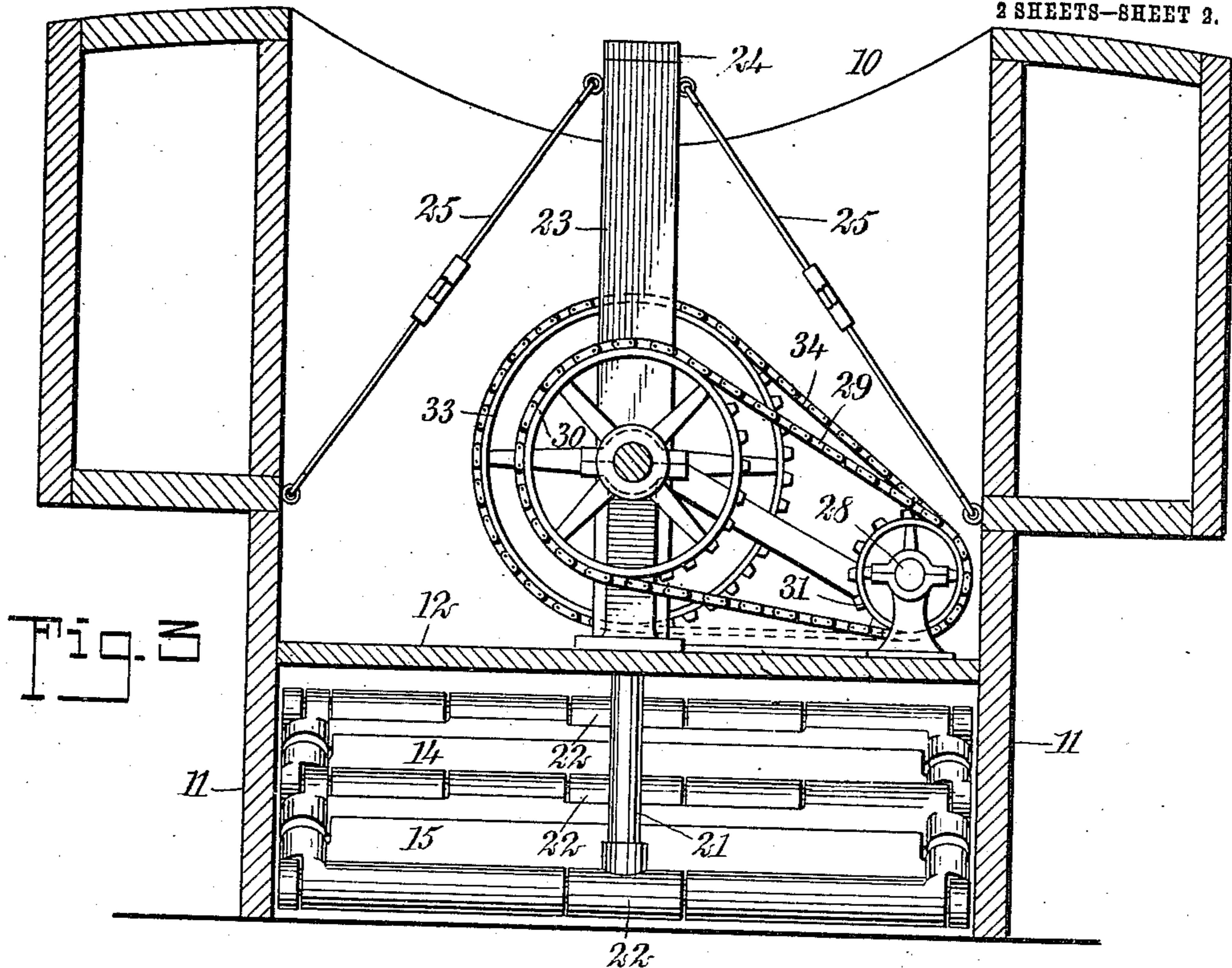
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WITNESSES  
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# UNITED STATES PATENT OFFICE.

JOSEPH TURNER, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN VERTEBRATE PROPELLER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ARIZONA TERRITORY.

## PROPELLER.

966,491.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed July 17, 1907, Serial No. 384,175. Renewed October 14, 1908. Serial No. 457,749.

*To all whom it may concern:*

Be it known that I, JOSEPH TURNER, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Propeller, of which the following is a full, clear, and exact description.

This invention relates to the propulsion of vessels, and more particularly to a special form of propeller involving a plurality of jointed sections moving sinuously between confining walls, the action of the series of propeller sections being somewhat similar to the action of a fish in water. The sections are moved in uniform succession, all of the sections going through the same cycle of movements, but each section being at a different point in the cycle from the adjacent sections. The water is displaced by this movement and forced toward the rear end of the vessel, thus tending to force the vessel itself forward. The sections of the propeller are joined to each other, and means are attached adjacent each end of each section for causing the movement thereof, all of said means being preferably connected to a common source of power.

The invention consists in certain features of construction and combinations of parts, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a side elevation of a vessel provided with my improved propelling means, a portion being broken away; Fig. 2 is an inverted plan view of the propeller and the confining walls; Fig. 3 is a transverse section on the line 3—3 of Fig. 1; Fig. 4 is a side elevation of a portion of the construction similar to a portion of Fig. 1, but on an enlarged scale; and Fig. 5 is a transverse section through one of the propeller operating rods and the operating mechanism therefor.

My improved construction is adaptable for use upon any form of vessel, and any number of propeller sections may be employed, operating either in a horizontal or

vertical direction as may be found advantageous in the particular instance.

In the drawings I have illustrated a vessel 10 having two substantially parallel vertically-disposed keels 11, and having the bottom 12 of the boat between these keels disposed substantially horizontally. Between the two keels and adjacent the bottom of the boat, there is provided a sinuously-operating propeller made up of any desired number of sections. In the present instance I have illustrated a propeller made of three separate sections 13, 14 and 15, all of substantially the same length and each of a width substantially equal to the distance between the two keels 11. Each section is hinged or pivoted to a hinge rod 16 at each end thereof, the hinge rods between adjacent sections being common to the two and serving to hold the two sections together. Means are provided for raising and lowering the hinge rods to give the desired movement to the sections, and as the planes in which the hinge rods move are all substantially parallel, each section is made up of two sliding or telescoping sections to accommodate for the varying distances between the hinge rods. As illustrated, the body portion of each section is formed of two plates 17 and 18, each connected to the adjacent hinge rod 16 at one end, and being in sliding engagement with the other plate at the opposite end. For holding the plates in engagement with each other, and for reinforcing them, I preferably provide telescoping members at each of the two opposite sides. As illustrated, each plate is rigidly secured to a tube 19, and these tubes are held in alignment by rods 20 which slide into the ends of the tubes. The plates and tubes are so disposed that the adjacent edges of the plates lie in engagement with each other, and the rods 20 are of such length as to normally prevent their withdrawal from the tubes. It is evident that the specific construction of the plates may be greatly varied without departing from the spirit of my invention, as other means may be devised for pivotally connecting the plates, reinforcing the same, and permitting of the variation in their lengths.

For operating the plates, I preferably provide a series of rods 21, each extending through a suitable stuffing box in the bottom

of the vessel, and each terminating in a collar 22 which incloses a corresponding hinge rod 16. There is preferably one more of these rods 21 than there are sections of the propeller, whereby a rod may be connected to the propeller at the intersection of each two adjacent sections, and one connected to each of the terminal end sections at its outer end. Various means may be provided for operating the rods to give the plates the desired movement, but the mechanism hereinafter described is especially designed for this purpose.

Extending upwardly from the bottom of the vessel, I provide a plurality of guides 23, each of the form illustrated in cross section in Fig. 5, and each of the operating rods 21 is so constructed at its upper end as to be securely held against lateral movement in any direction by the corresponding guide, but permitted to move freely in a vertical direction. The lower portion of each rod is preferably round in cross section and extends through a stuffing box in the bottom of the guide, whereby water is prevented from entering the vessel around said rods. The guides are rigidly secured against lateral movement by any suitable means, as, for instance, a bar 24 in engagement with the upper end of each of the guides, and by bars 25 extending from each guide to the sides of the vessel and having turnbuckles therein, whereby all possible vibration of the guides is eliminated.

For reciprocating the operating rods within their guides, I provide any suitable motive power, as, for instance, an engine 26 illustrated diagrammatically in Fig. 1, and having a shaft 27 delivering power to the main drive shaft 28, through a suitable gearing including a chain 29 and sprocket wheels 30 and 31. The main drive shaft 28 extends the full length of the propeller, and means are provided for transmitting motion from this shaft to the several reciprocating propeller operating rods 21. As illustrated, I provide a short shaft and suitable bearings 32 therefor, intermediate each alternate pair of guides 23, and this shaft carries a sprocket wheel 33, whereby motion may be imparted to the shaft from the main drive shaft 28 by a suitable chain 34. At each end of the shaft there is provided a crank 35 having the outer end thereof connected by a link 36 to the upper end of one of the operating rods. Each link is pivotally connected to its rod and crank, and the two adjacent cranks on the same shaft are set at different angles to each other, whereby no two adjacent operating rods 21 are in the same portion of their cycle of operation at the same time. When there are four operating rods, as in the form illustrated, the mechanism is so constructed that each of the four cranks is at an angle of 45 degrees behind the crank

next adjacent toward the front of the vessel; thus as the shaft 28 rotates the four alternate rods 21 are moved vertically, but the movement is such that when the first rod reaches the end of its downward stroke, the second rod will be in the middle of its downward stroke, the third rod will be at the upper dead center, and the fourth rod will be intermediate its upward stroke, the parts occupying the positions illustrated in Fig. 1. As the shaft rotates, the first rod rises, the second and third rods descend, and the fourth rod rises, so as to give the propeller a sinuous waving motion and advance the vessel in the same manner as a fish is advanced by the movement of its body and tail.

As illustrated, only a single series of sections is employed and these sections move in a vertical direction between oppositely-disposed walls forming keels. It is, of course, understood that a plurality of series may be employed at different points on the hull of the vessel, and that the sections of the propeller may set on edge and move in a horizontal direction rather than as illustrated.

Any suitable means may be employed for steering the vessel, the means illustrated comprising two rudders 37, each mounted adjacent the rear end of one of the keels.

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

1. A propeller including a propeller section having two telescoping reinforcing members at opposite sides thereof and plates carried by said members and having their adjacent ends overlapping and in sliding engagement with each other, and means connected to the opposite ends of said section for operating the same.

2. A propeller including a propeller section having two telescoping reinforcing members at opposite sides thereof and plates carried by said members and having adjacent ends overlapping and in sliding engagement with each other, and means connected to the opposite ends of said section for operating the same, said means comprising a plurality of parallel reciprocating rods pivotally connected to said reinforcing members.

3. A propeller, comprising two parallel reciprocating rods, a propeller section pivotally connected to said rods, said section including telescoping reinforcing members at opposite sides thereof, and two plates carried by the opposite ends of the section and having their adjacent ends overlapping and in sliding engagement with each other.

4. In combination, a propeller formed of a series of sections jointed together, a plurality of operating rods pivotally connected to each end of each of said sections, guiding

rods inclosing a portion of one end of each of said rods and preventing lateral movement in one direction, links connected to said operating rods, and means connected to said links for operating the rods to give the series of sections a sinuous movement.

5. In combination, a vessel having a suitable source of power, two substantially parallel keels depending from said vessel and symmetrically disposed upon opposite sides thereof, a propeller formed of a series of sections hinged together and disposed between said keels, a plurality of reciprocating rods extending through the bottom of the vessel and in engagement with said sections, a main drive shaft operatively connected to said source of power, and means connecting said shaft to said operating rods, whereby the latter are reciprocated to give the propeller a sinuous movement.

6. In combination, a vessel having a main shaft disposed longitudinally thereof, a plurality of operating rods extending through one wall of said vessel, a propeller comprising a plurality of sections, each section being pivotally connected to the ends of two of said operating rods, an auxiliary shaft substantially parallel to said main shaft and disposed intermediate two adjacent operating rods, crank and link connections from said auxiliary shaft to said operating rods, and gearing connecting said main shaft and said auxiliary shaft, whereby a sinuous motion is transmitted to said propeller sections upon the rotation of said main shaft.

7. A propeller including a propeller section having two telescoping reinforcing members at opposite sides thereof and plates carried by such members and having their adjacent ends overlapping, and means connected to the opposite ends of said section for operating the same.

8. In combination, a vessel having a main shaft disposed longitudinally thereof, a plu-

45 rality of operating rods extending through one wall of said vessel, a propeller comprising a plurality of sections connected to said operating rods, an auxiliary shaft substantially parallel to said main shaft and disposed between two adjacent operating rods, connections from said auxiliary shaft to said operating rods, and gearing connecting the main shaft and auxiliary shaft whereby a sinuous motion is transmitted to said propeller upon the rotation of the main shaft.

9. The combination with a sinuous propeller comprising hingedly connected sections, each of said sections consisting of slidably overlapped plates, of tubular reinforcing members carried by the plates, and rods slidably engaged in the tubular reinforcing members that are located at the same side of the plate.

10. The combination with a sinuous propeller comprising hingedly connected sections, each of said sections consisting of slidably overlapped plates, of tubular reinforcing members carried by the plates and disposed in alinement with their adjacent ends open, and rods having their end portions slidably engaged in the reinforcing members.

11. The combination with a plurality of spaced operating rods, of a sinuous propeller connected thereto, a main drive shaft, an auxiliary drive shaft located between the adjacent operating rods, gearing connecting the shafts, cranks on the auxiliary shafts, and link connections between the cranks and operating rods.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH TURNER.

Witnesses:

CLAIR W. FAIRBANK,  
EVERARD B. MARSHALL.