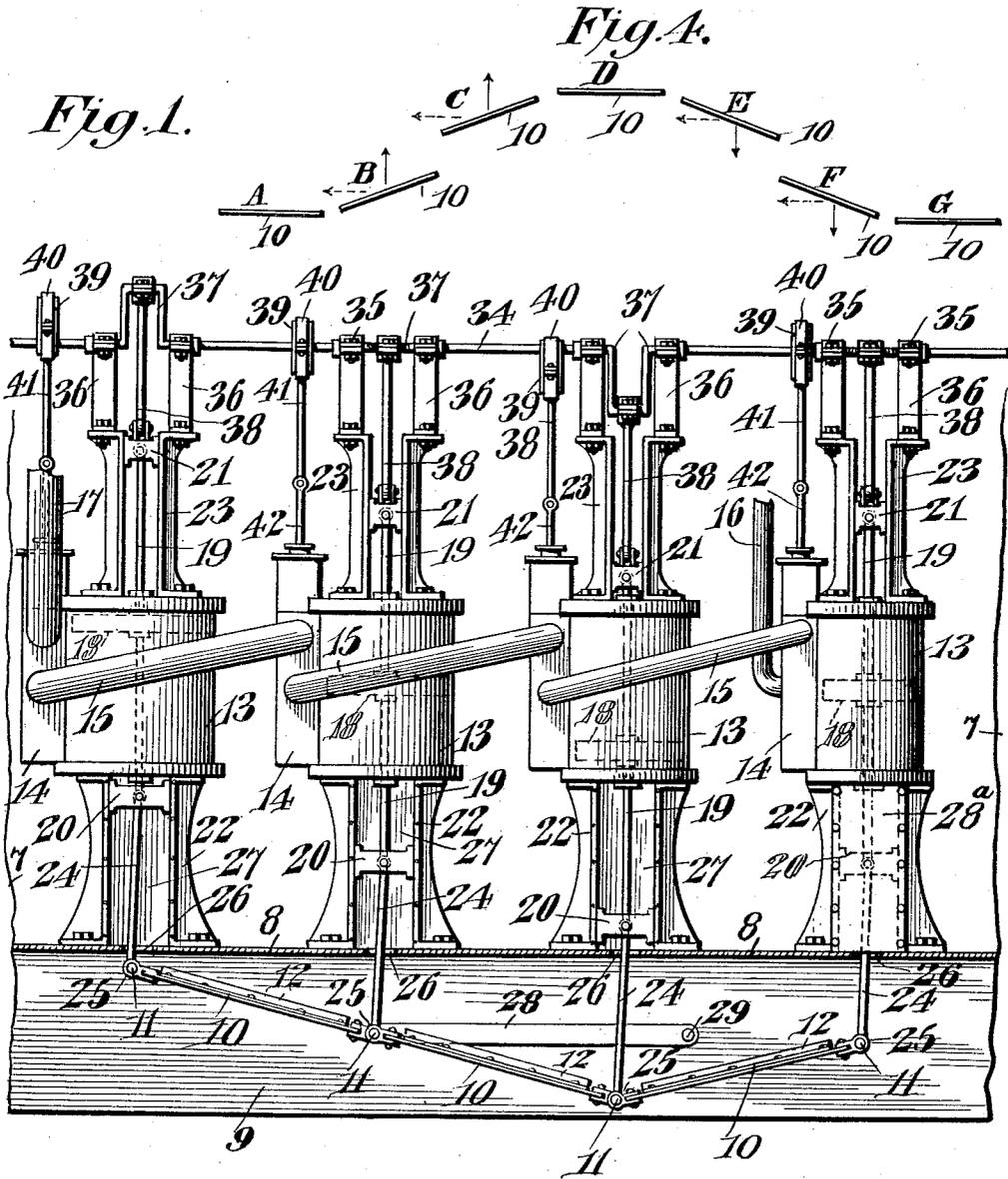


J. TURNER.
 PROPELING MECHANISM.
 APPLICATION FILED MAY 14, 1908.

1,109,155.

Patented Sept. 1, 1914.

3 SHEETS-SHEET 1.



Joseph Turner, Inventor

Witnesses
 Jas. E. McLaughlin
 [Signature]

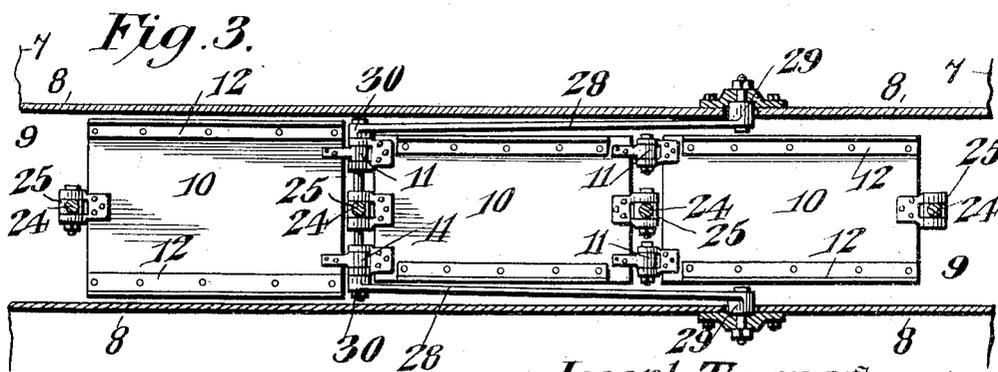
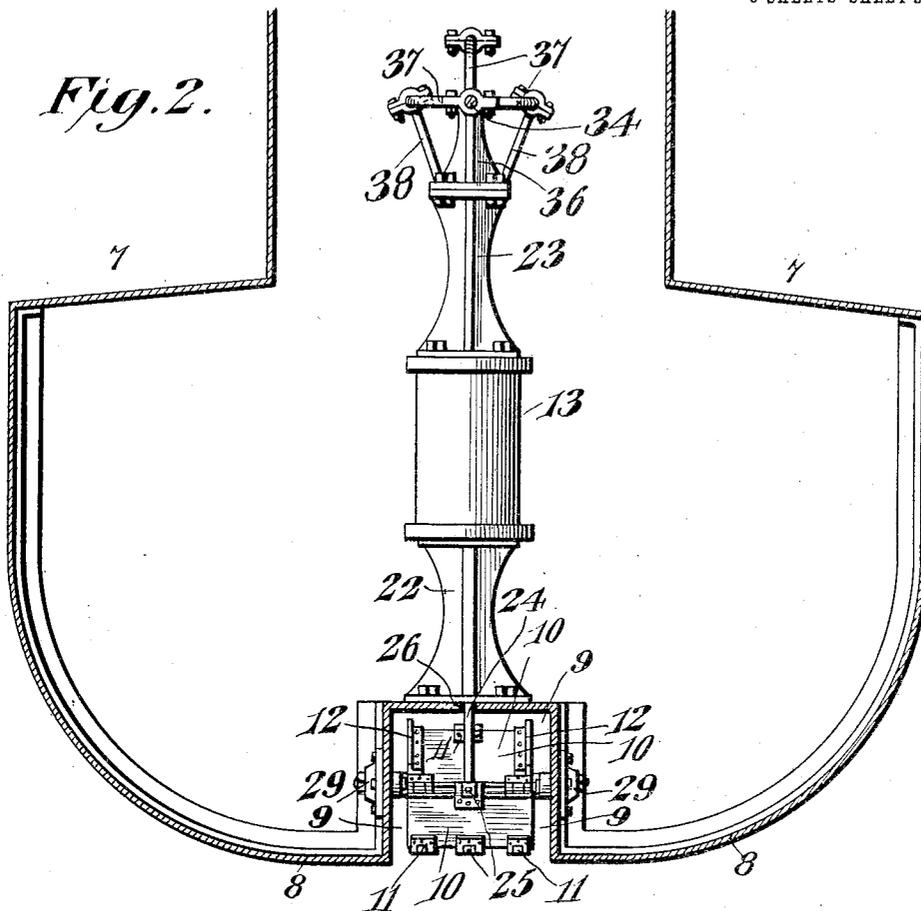
By [Signature]
 Attorney

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3 SHEETS—SHEET 2.



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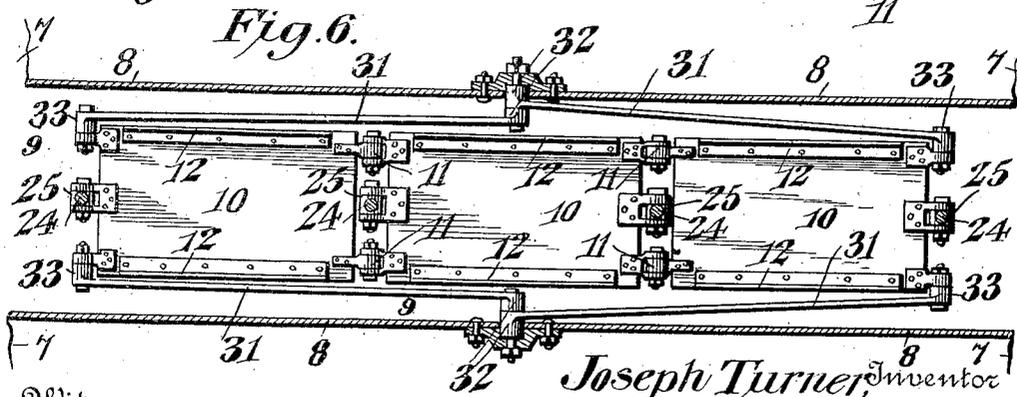
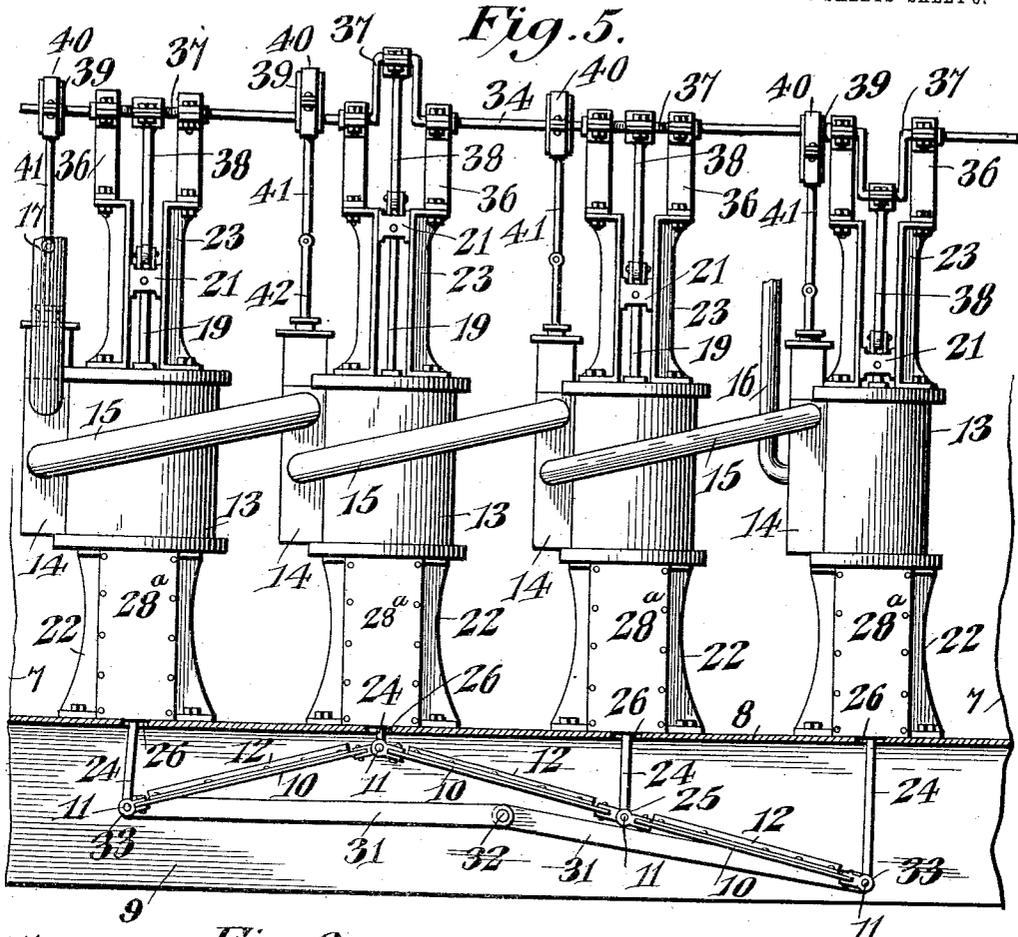
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E. G. Siggers
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1,109,155.

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3 SHEETS—SHEET 3.



Witnesses
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[Signature]

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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.

PROPELLING MECHANISM.

1,109,155.

Specification of Letters Patent.

Patented Sept. 1, 1914.

Application filed May 14, 1908, Serial No. 432,910. Renewed November 3, 1909. Serial No. 526,106.

To all whom it may concern:

Be it known that I, JOSEPH TURNER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Propelling Mechanism, of which the following is a specification.

The present invention relates to propelling mechanism of the type that employs a propeller having a sinuous, snake-like or fish-tail movement, and one of the primary objects is to provide a novel structure of a simple, practical nature that will have a powerful action, and at the same time is compact so that it will occupy but little space.

A further object is to so construct the mechanism that it is housed and protected, thus adapting it for the use of vessels in either deep or shallow water.

A further and important object is to provide mechanism that can be successively employed in connection with a compound engine, the different pistons of such engine being separately connected thereto so that the power of each is directly utilized.

Another object is to provide means which will effectively maintain the pistons in a predetermined cycle of movement in order to insure at all times the proper sinuous operation of the propeller.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal sectional view through a portion of a vessel, showing the propeller mechanism in elevation. Fig. 2 is a cross sectional view through the same. Fig. 3 is a horizontal sectional view. Fig. 4 is a diagrammatic view illustrating the different positions assumed by a propeller blade during its cycle of movement. Fig. 5 is a longitudinal sectional view showing a slightly modified form of construction. Fig. 6 is a horizontal sectional view through the same.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, the hull of the boat is designated 7, and may be of any suitable type, the bottom 8 thereof having a central longitudinally disposed channel 9. It is open ended, and is bottomless. In this channel operates the propeller, which is

capable of a sinuous movement, and comprises sections or blades 10 that are inextensible, and are hingedly connected as shown at 11. These blades are preferably constructed of sheet metal, reinforced by two or more bars 12 of angle iron or suitable material disposed longitudinally of said blades.

Upon the portion of the bottom in which is formed the channel and directly above the propeller is an engine, preferably of the compound type, that is to say, comprising a series of cylinders 13 of successively greater diameter, each cylinder having a suitable steam or motive fluid chest 14, and the exhaust from one cylinder being conducted to the intake of the next by a suitable pipe 15. A supply pipe 16 is connected to the steam chest of the high pressure cylinder, and an exhaust pipe 17 leads from the steam chest of the low pressure cylinder. Operating in each cylinder is a piston 18, which is connected to a piston rod 19 extending through both ends of the cylinder, said piston rod having connected to its upper and lower ends, cross heads 20 and 21 that respectively operate between guides 22 and 23. Pitmen 24 are pivoted at their upper ends to the cross heads 20 and consequently to the lower ends of the piston rods, and are pivoted at their lower ends to the sections or blades of the propeller, as shown at 25. Said pitmen operate through slots 26 in the bottom of the boat, which slots communicate with the channel, and the cross heads preferably operate in water tight compartments 27 formed by walls 28^a secured to the guides 22.

Inasmuch as the structure thus far described would permit unlimited swinging of the propeller longitudinally in the channel, means are provided for governing such movement, and in the present embodiment this means consists of swinging links 28 pivoted as shown at 29 to the walls of the channel, and as illustrated at 30 to the propeller. Instead of one set of links as shown in Figs. 1 and 3, a double set may be employed, as illustrated in Fig. 5, the links 31 on either side being connected by a common pivot 32 to the side walls of the channel, and being pivoted at their outer ends, as shown at 33 to the ends of the propeller. With this exception the structure illustrated in Figs. 5 and 6 is the same as that disclosed in Figs.

1-4 inclusive, and therefore the same reference numerals have been employed.

In order to absolutely insure the proper sequence of movement of the different pistons, a shaft 34 is employed located above the cylinders, and journaled in boxes 35 carried by standards 36 that are fixed to the guides 23. This shaft is provided with angularly disposed cranks 37 and pitmen 38, connected to said cranks, are pivoted to the upper cross heads 21, and consequently to the piston rods 19. The shaft 34 is furthermore provided with eccentrics 39 surrounded by straps 40 and connected to these straps are pitmen 41, which are connected to valve stems 42 and serve to operate the valves of the engine, as will be obvious.

The operation of the mechanism may be briefly outlined as follows: Taking one blade or section of the propeller, referring to Figs. 1 and 4, and assuming that said blade is in its lowermost position, as shown in Fig. 4 at A, starting at a horizontal position, the same is moved upwardly, as shown at B and C, in which case, it is disposed at substantially the inclination shown. The direction of movement of said blade is indicated by the arrows in full lines, and its action against the water is indicated by the arrows in dotted lines. As it reaches the limit of its bodily upward movement, it assumes a horizontal position, as shown at B, and then it moves downwardly and shifts to a downward inclination as illustrated at E and F, whereupon its under side is acting against the water, as indicated. Upon reaching its downward limit of movement it again reverses its angle of inclination for the upward movement, the horizontal position being shown at G. Each of the blades or sections of the propeller follows the one before it in the same cycle of movement, and consequently the propeller, as a whole, has a sinuous movement, producing great force. As already stated, its longitudinal movement of the channel is governed by the links 28 or 31, and the proper operation of the engine is secured by the crank shaft 34 and its connection with the pistons. Moreover, inasmuch as the propeller is housed within the bottom of the boat, it is completely protected from exterior obstructions and the mechanism is applicable to vessels of any draft and for use in both deep and shallow water.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention. For

instance, while the structure is shown as means for propelling a vessel, it may be mounted on a stationary support and constitute means for propelling liquid or it can also be utilized as a motor, the propeller being placed in running water and the current effecting its operation.

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

1. In mechanism of the character set forth, the combination with a propeller comprising a plurality of inextensible inelastic or stiff sections flexibly connected, of means acting upon the individual sections and connected with the same at the joints thereof to produce a sinuous movement of the propeller, said means allowing limited movement of the sections longitudinally.

2. In mechanism of the character set forth, the combination with a propeller comprising a plurality of inextensible inelastic or stiff sections flexibly connected, of means acting upon the respective adjacent sections in timed sequence and connected with the same at the joints thereof to produce a sinuous movement of the propeller, said means allowing limited movement of the sections longitudinally.

3. In mechanism of the character set forth, the combination with a propeller comprising a plurality of inextensible inelastic or stiff sections flexibly connected in tandem relation, of means acting transversely upon adjacent sections at their points of connection to produce a sinuous movement of the propeller, and separate means from the said means to cause limited longitudinal movement of the propeller sections.

4. In mechanism of the class described, the combination with a propeller comprising a plurality of inextensible inelastic or stiff sections hingedly connected and acting individually upon the water, of pitmen connected to the propeller and swinging longitudinally of the same, and movable means to which the pitmen are pivotally connected.

5. In mechanism of the character set forth, the combination with a flexible propeller capable of sinuous movement, of a plurality of reciprocatory rods, and pitmen connected to the rods and to the propeller and having a swinging movement in a direction longitudinally of the said propeller.

6. In mechanism of the character set forth, the combination with a flexible propeller capable of sinuous movement, of a plurality of reciprocatory rods, pitmen connected to the rods and to the propeller and having a swinging movement in a direction longitudinally of the said propeller, and means connected with the rods for reciprocating the same, and separate means connected with the said rods for insuring their movement in a predetermined sequence.

7. In mechanism of the character set forth, the combination with a flexible propeller capable of sinuous movement, of a plurality of reciprocatory rods, means for reciprocating the rods, pitmen connected to the rods and to the propeller and having a swinging movement longitudinally of the said propeller, and a shaft having a plurality of angularly disposed cranks connected with the said rods for insuring their movement in a predetermined sequence.

8. In mechanism of the character set forth, the combination with a propeller comprising a plurality of hingedly connected inextensible sections, of reciprocatory rods, means for reciprocating the rods, connections between the rods and sections, means connected to the rods for insuring their movement in a predetermined sequence, and means separate from the said means for causing the section to have a forward and backward movement in addition to their reciprocal movement.

9. In mechanism of the character set forth, the combination with a propeller comprising hingedly connected inextensible sections, of reciprocatory rods, means for reciprocating the rods, connection between the rods and sections to permit of longitudinal movement of the sections, means separate from the said connections for limiting such longitudinal movement, a shaft having a plurality of angularly disposed cranks, and connections between the cranks and rods.

10. In mechanism of the character set forth, the combination with a support, of a flexible propeller having a sinuous movement, pitmen connected to the propeller at intervals and arranged to swing longitudinally of the same, means separate from the pitmen for holding the propeller against unlimited longitudinal movement with respect to the support, reciprocatory devices connected to the pitmen, and means connected with the said devices for insuring their movement in a predetermined sequence.

11. In mechanism of the character set forth, the combination with a support, of a flexible propeller having a sinuous movement, swinging pitmen connected to the propeller at intervals, movable actuating means to which the pitmen are pivotally connected, means separate from the pitmen and connected to the propeller for holding the same against unlimited longitudinal movement with respect to the support, and means also connected with the said pitmen for insuring their movement in a predetermined sequence.

12. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of swinging supporting devices connected thereto, reciprocatory means to which the supporting devices are pivotally connected, and a swinging link

also connected to the propeller to prevent its unlimited longitudinal movement and the free swinging movement of the links.

13. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of swinging pitmen connected to the propeller, reciprocatory devices to which the pitmen are pivotally connected, and swinging links connected to opposite portions of the propeller to prevent the unlimited longitudinal play of the same.

14. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of reciprocatory devices, swinging pitmen connecting the devices with different portions of the propeller, movable means to which the swinging pitmen are connected, and swinging links disposed in angular relation to the pitmen and connected to the propeller to permit limited longitudinal movement thereof.

15. In mechanism of the character set forth, the combination with a propeller comprising a plurality of pivotally connected sections, of reciprocatory devices, pitmen connecting the devices and the different sections, and links disposed longitudinally of the propeller and pivotally connected thereto to permit limited longitudinal movement thereof.

16. In mechanism of the character set forth, the combination with a propeller including a plurality of inextensible blades, of reciprocatory devices, means connected with the said devices for insuring their movement in a predetermined sequence, swinging means connected to the reciprocatory devices and to the blades to cause each blade to move bodily in opposite directions and at opposite inclinations and for reversing the inclination at the end of such bodily movements, and means for causing a forward and backward swinging movement of the blades in addition to the said movements.

17. In mechanism of the character set forth, the combination with a propeller including a plurality of inextensible flexibly connected blades, of reciprocatory devices, swinging pitmen connected to the devices and to the blades at the ends thereof, and means also connected with the propeller at the ends of the adjacent blades for governing the longitudinal movement of the blades and for preventing the free swinging movement of the pitmen.

18. In mechanism of the character set forth, the combination with a propeller including a plurality of inextensible flexibly connected blades, of reciprocatory devices, swinging pitmen connected to the devices and to the end portions of the blades, and links connected to the opposite sides of the propeller at the ends of the adjacent blades and disposed longitudinally of the same to

permit limited longitudinal movement of the blades.

19. In mechanism of the character set forth, the combination with a plurality of hingedly connected inextensible blades, of reciprocatory rods, pitmen pivoted to the rods and to the blade at their hinged joints, and links disposed in angular relation to the pitmen and pivoted to the blade to permit limited longitudinal movement thereof.

20. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of a compound engine comprising a plurality of cylinders, reciprocatory pistons operating in the cylinders, and means for conducting the exhaust from one cylinder to the next, piston rods connected to the pistons, and pitmen connections between the piston rods and propeller, said pitmen swinging longitudinally of the propeller.

21. In mechanism of the character set forth, the combination with a propeller comprising a plurality of hingedly connected blades, of a compound engine comprising a plurality of cylinders of different diameters, reciprocatory pistons operating in the cylinders, and means for conducting the exhaust from one cylinder to the intake of the next, piston rods connected to the pistons, and pitmen connections between the piston rods and propeller blades.

22. In mechanism of the character set forth, the combination with a propeller comprising a plurality of hingedly connected sections, of a plurality of cylinders, pistons operating in the cylinders and having rods, pitmen pivoted to the rods and to the propeller sections, and swinging links pivoted to the propeller and disposed in angular relation to the pitmen to permit limited longitudinal movement thereof.

23. In mechanism of the character set forth, the combination with a propeller comprising a plurality of hingedly connected inextensible sections, of a compound engine comprising a plurality of cylinders of different sizes, pistons operating in the cylinders, piston rods connected to the pistons, swinging pitmen pivoted to the rods and to the propeller at the joint between the sections thereof to permit limited longitudinal movement thereof, means for exhausting motive fluid from one cylinder into the next, and swinging links disposed longitudinally of the propeller and pivoted to opposite sides of the same.

24. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of a plurality of

cylinders, pistons operating in the cylinders, operative connections between the pistons and propeller, and means connected to said pistons for effecting their movements in a predetermined sequence to secure a sinuous movement on the part of the propeller.

25. In mechanism of the character set forth, the combination with a propeller having a sinuous movement, of a plurality of cylinders, pistons operating in the cylinders and connected to the propeller, a shaft having angularly disposed cranks, and pitman connections between the pistons and the cranks.

26. In mechanism of the character set forth, the combination with a sinuous propeller comprising a plurality of hingedly connected inextensible blades, of vertical cylinders disposed above the blades, pistons operating in the cylinders, piston rods connected to the pistons and projecting through opposite ends of the cylinders, pitman connections between the lower ends of the rods and the propeller, a shaft located above the pistons and having angularly disposed cranks, and pitman connections between the cranks and the upper ends of the piston rods.

27. In mechanism of the character set forth, the combination with a vessel's hull having a channel provided with an open end and an open bottom, of a propeller located longitudinally in said channel and comprising hingedly connected sections, links pivoted to the sides of the channel and to the propeller, cylinders located in the hull and having reciprocatory pistons therein, pitman connections between the pistons and the propeller, and means connected to said pistons for insuring their movement in a predetermined sequence to effect a sinuous movement of the propeller.

28. In mechanism of the character set forth, the combination of a propeller comprising a plurality of hingedly connected sections, means for moving the sections vertically, means for insuring the vertical movement of the sections in a predetermined sequence, and separate means for simultaneously imparting to the blades a backward and forward movement, said movements cooperating to produce a sinuous movement of the propeller.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOSEPH TURNER.

Witnesses:

JOHN H. SIGGERS,

B. G. FOSTER.