(No Model.)

2 Sheets—Sheet 1.

C. M. CATLIN.

STEAMBOAT.

No. 344,621. Patented June 29, 1886.

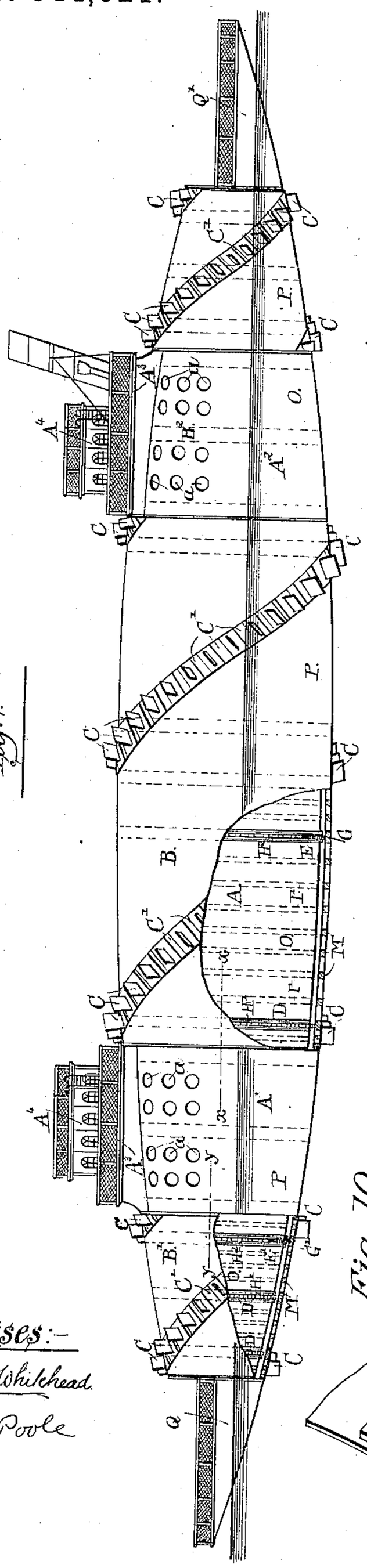

Fig. 1.

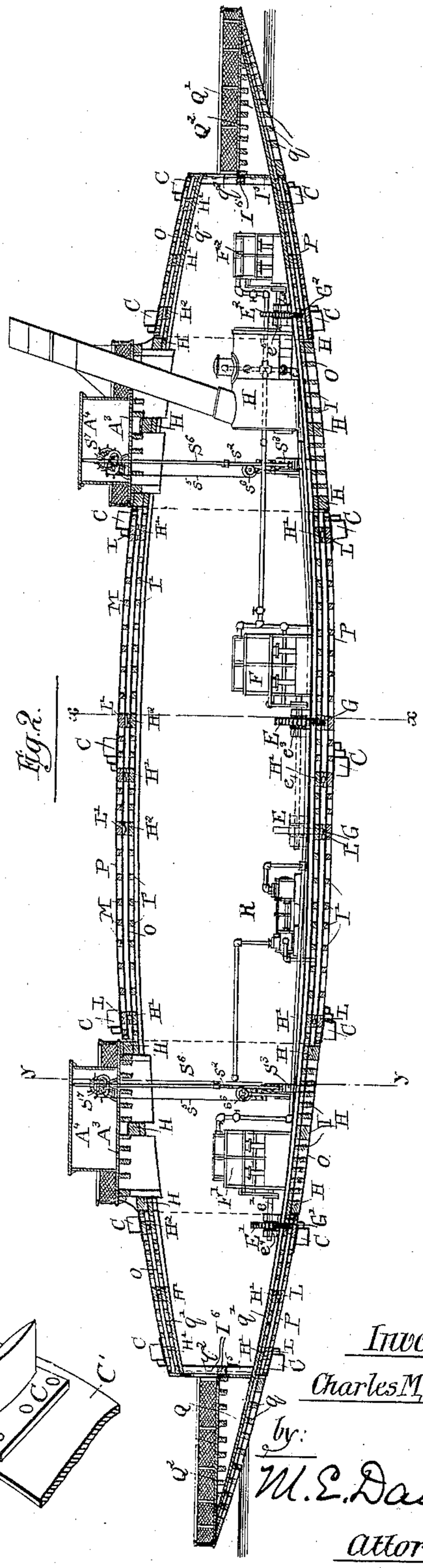

Fig. 2.

Fig. 10.

Witnesses:-

Louis M. T. Whitehead.

C. C. Poole

Inventor:

Charles M. Catlin.

by:

W. E. Dayton

Attorney:

(No Model.)

2 Sheets—Sheet 2.

C. M. CATLIN.

STEAMBOAT.

No. 344,621. Patented June 29, 1886.

Fig. 4.

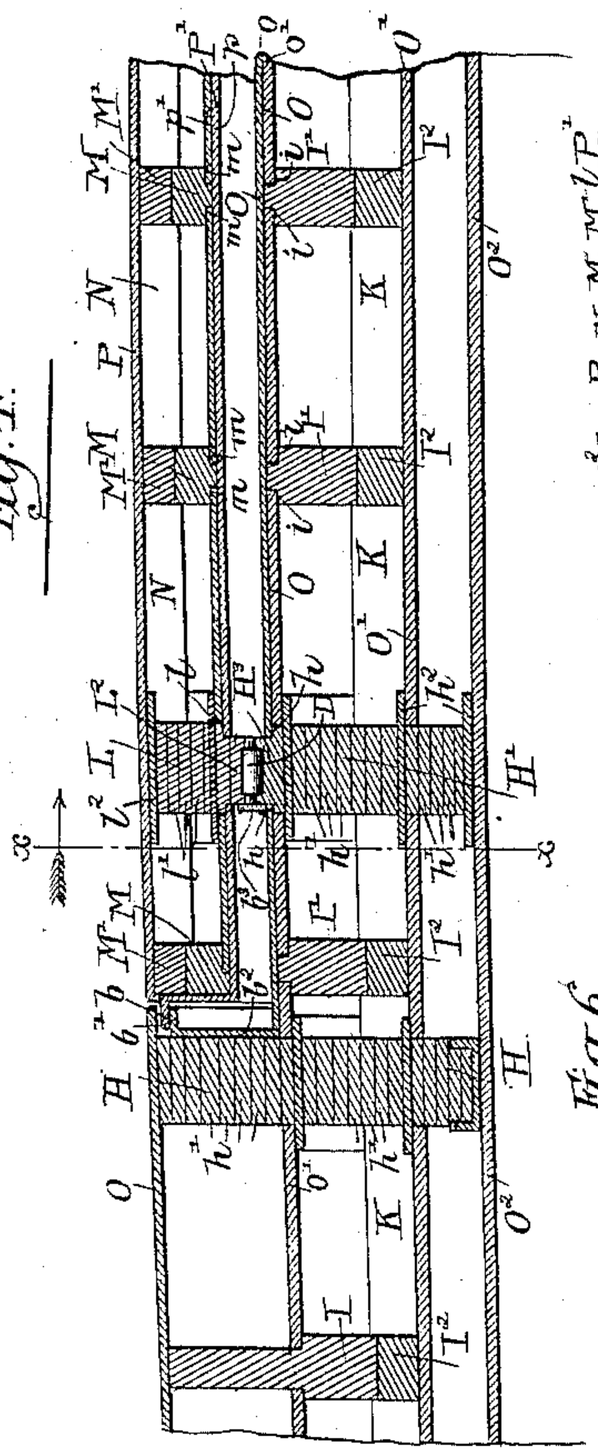

Fig. 6.

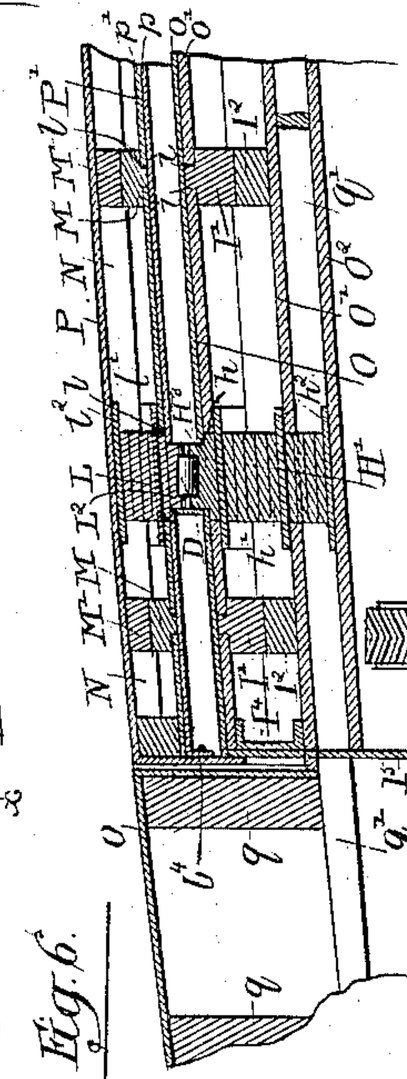

Fig. 7.

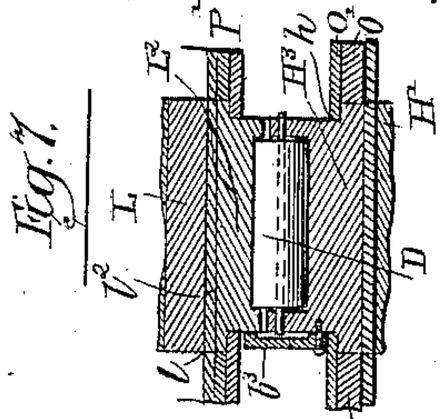

Fig. 9.

Fig. 8.

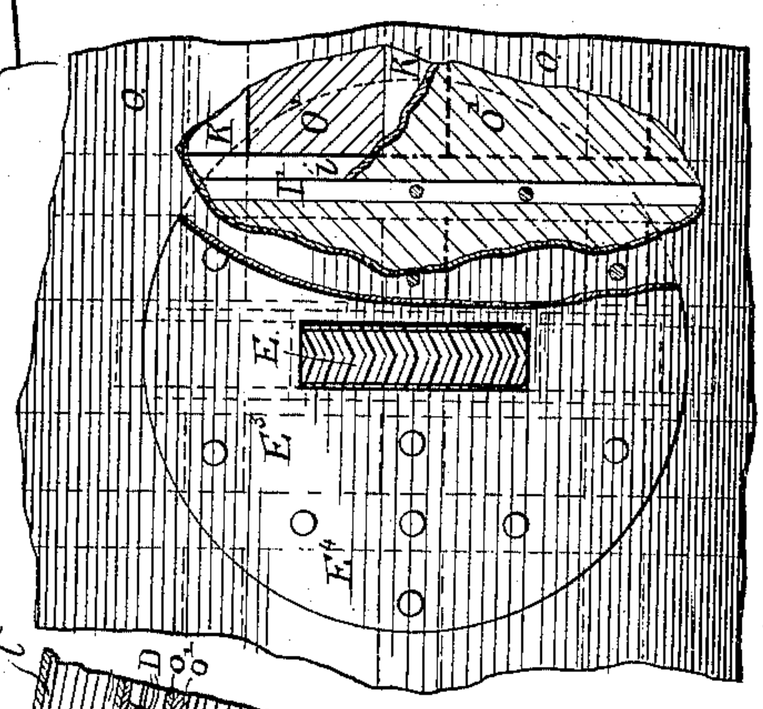

Fig. 5.

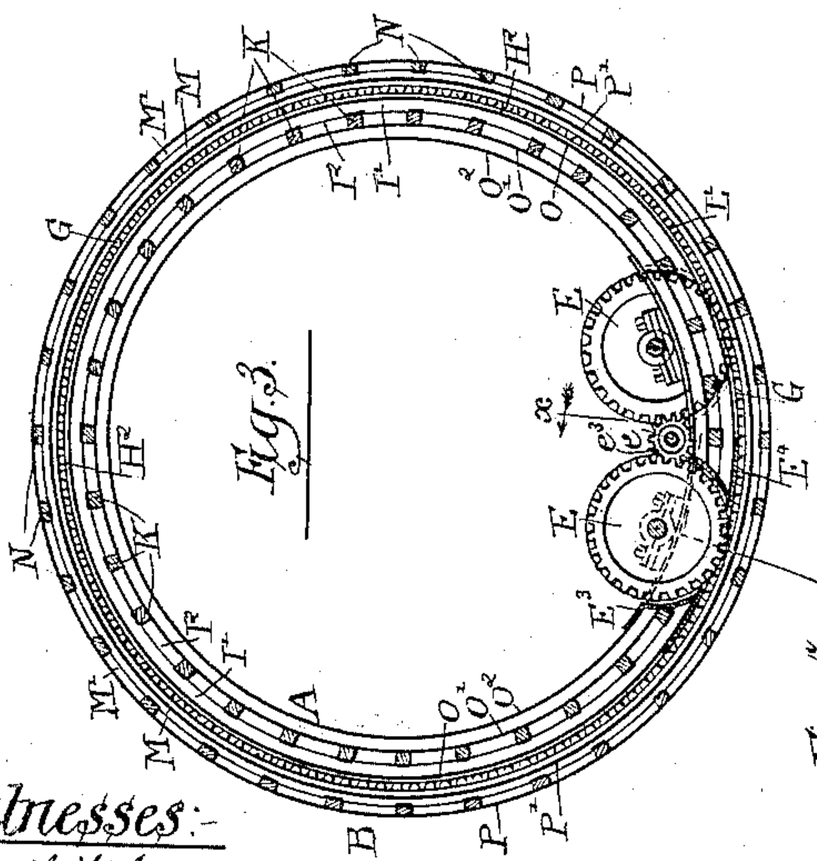

Fig. 3.

Witnesses:-

Louis W. Y. Whitehead.

C. C. Poole

Inventor:

Charles M. Catlin.

by:-

W. E. Dayton

Attorney.

UNITED STATES PATENT OFFICE.

CHARLES M. CATLIN, OF CHICAGO, ILLINOIS.

STEAMBOAT.

SPECIFICATION forming part of Letters Patent No. 344,621, dated June 29, 1886.

Application filed August 7, 1885. Serial No. 173,818. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. CATLIN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steamboats; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improvement in steamships or other vessels propelled by steam; and it consists in the matters hereinafter described, and pointed out in the appended claims.

The vessel herein illustrated as embodying my invention is constructed with a body or hull which is mainly cylindric in cross-section, and which is provided about its exterior with one or more revolving annular shells or cylinders provided with propelling-blades upon their outer surfaces, suitable anti-friction rollers being placed between the outer surface of the main part of the vessel and the revolving parts or cylinders, whereby the latter may freely turn upon the former. Suitable engines are provided for actuating the said revolving parts, the latter being desirably provided with interior toothed bars or racks engaged by cog-wheels driven by the engines.

In the accompanying drawings, illustrating my invention, Figure 1 is a side view of a vessel constructed in accordance with my invention, a portion of the revolving shells being shown as broken away. Fig. 2 is a longitudinal section of the same. Fig. 3 is a transverse section of the same upon an enlarged scale, taken upon line *x x*, Fig. 2. Fig. 4 is an enlarged detail sectional view taken upon line *x x*, Fig. 1, showing in detail the construction of the hull and the revolving shell. Fig. 5 is an enlarged detail sectional view taken upon line *x x* of Fig. 4. Fig. 6 is a detail sectional view through parts of the hull, taken upon line *y y*, Fig. 1. Fig. 7 is an enlarged detail sectional view illustrating the rollers shown in Figs. 4 and 5. Figs. 8 and 9 are enlarged detail views illustrating the gear-wheels for driving the revolving shells of the vessel. Fig. 10 is a detail perspective view of one of the propeller-blades upon one of the outer revolving shells.

In the particular form of vessel herein illustrated as one practical embodiment of my invention, A indicates the main portion or hull of the vessel, which is in its general form circular in cross-section and tapered from its middle toward its ends; and B B′ B² are tubular revolving shells, also circular in cross-section, and placed around the body of the vessel, said shells being provided upon their outer surfaces with inclined propeller-blades C, and constructed to rest and move upon anti-friction rollers D, suitably sustained upon the outer surface of the hull A with their axes generally parallel with the central longitudinal axis of the hull.

The revolving shell B is made to extend over the main or middle part of the vessel, and the shells B′ B² are arranged to cover portions of the hull adjacent to the bow and stern, spaces or zones A′ A², of considerable width, being left between the ends of the shells B and B′ B², at which the hull itself is exposed, and forms the outer surface of the vessel. These parts A′ and A² are preferably arranged flush at their outer surfaces, with the outer surfaces of the tubular shells B, B′, and B², so as to form a smooth or continuous outer surface to the entire vessel, and are provided with windows *a a*, herein shown in the form of the familiar "bull's-eyes," to admit light to the interior of the vessel. Upon these parts A′ A² of the hull also are formed horizontal decks A³ A³, upon which are placed pilot-houses, as A⁴ A⁴, or other deck-houses.

The tubular shells B, B′, and B² are actuated by means of gear-wheels E E′ E² driven by suitable engines, F F′ F², and extending through suitable aperture in the hull A and engaging gear teeth or racks G G′ G² upon the inner surfaces of the said shells. In the particular construction illustrated the several engines, F F′ F², are supplied from a single boiler, H, located in convenient position for the smoke-stack to pass upwardly through the rear deck, A³, as herein shown, also two gear-wheels operated by suitable gearing from a single shaft, as *e e′ e²*, are used for each part B B′ B², the said shafts being each actuated directly by an

engine and provided with gear wheels or pinions e^3 e^4 e^5, intermeshing with the wheels E E′ E². The said shells may obviously, however, be driven by actuating devices constructed otherwise than as herein shown without departure from the spirit of my invention.

In carrying out the general features of my invention above set forth the hull A and tubular shells B, B′, and B² may be constructed either of wood or metal and in any manner found convenient or desirable. A means of constructing the hull and tubular shells involving features of novelty is, however, herein shown, and is as follows: The frame-work or skeleton of the hull proper is formed by means of the main circular or circumferential ribs or frame-pieces H, H′, and H², intermediate lighter circular ribs, I I′, and longitudinal frame-timbers K, extending from end to end of the vessel and attached to the ribs H H′ H² and I I′ at their points of intersection with the latter. The main circular ribs H are located in the parts A′ A² of the hull which are not covered by the revolving shells B, B′, and B², and the ribs H′ and H² are located in the parts of the hull covered by the said shells, the ribs H forming foundations or supports for trough-shaped iron bands or channel-beams H³, which afford bearings for the anti-friction rollers D, and the ribs H² supporting similar channel-beams, H⁴, in which the cogs or teeth of the rack G G′ G² are located and move when the shells are revolved. The intermediate ribs, I′, are located in the parts of the hull beneath the revolving shell between the main ribs H′ and H², and the ribs I are placed in the parts A′ A² of the hull, said ribs I and the main ribs H in these parts of the hull being made considerably thicker diametrically than the ribs H′, H², and I′, so as to bring the outer surface of the said parts A′ A² flush with the outer faces of the shells B, B′, and B², as will hereinafter more fully appear.

The shells B, B′, and B² are constructed generally in the same manner as is the main part of the hull, the frames thereof consisting of main ribs L L′, intermediate ribs, M, and longitudinal timbers N, as more clearly shown in Figs. 4 and 5. The said ribs L are arranged opposite the ribs H′ of the hull, and have secured to their inner surfaces channel-beams L², located in opposition to the channel-beams H³, and forming annular bearing-surfaces for the rollers D. The ribs L′ also are arranged opposite the ribs H² of the hull, and afford support for the toothed bands or racks G G′ G².

The outer sheathing or skin, O, of the hull proper is attached to the ribs H, H′, H², I, and I′, the longitudinal timbers K being attached to the inner faces of the said several ribs and supporting a second inner sheathing, O′. Filling-pieces I² are placed against the inner faces of the ribs I and I′ and between the longitudinal beams K, to form additional supports for the said inner sheathing, O′, and to additionally stiffen the frame.

The outer skin or sheathing is preferably made in two thicknesses or layers, *o* and *o′*, the outer thickness, *o*, being made of metal, and the inner thickness, *o′*, of wood. The said inner layer, *o′*, is composed of relatively short sheathing boards or planks placed at their ends in rabbets *i*, formed at the outer corners of the ribs I, and arranged to abut against the side edges of the channel-beams H³ and H⁴, which are bolted or otherwise secured to the outer surfaces of the main ribs H′ and H², the said sheathing boards or planks being arranged diagonally, as shown in Fig. 8, so as to brace the parts of the frame from angular displacement. The inner sheathing, O′, is also laid diagonally with the boards or planks thereof transverse to those of the layer *o′*, the ends of the planks of said sheathing being arranged to abut against the sides of the main ribs H H′ H², whereby the entire frame is provided with two layers of inclined sheathing running in opposite directions, with obvious advantages in giving stiffness and rigidity thereto.

The outer metallic layer, *o*, of the outer skin, O, is placed over the sheathing-planks of the layer O′ and against the ribs I′ in their projecting parts, between the rabbets *i*. The plates comprising the outer layer of the skin also are lapped over and secured to marginal flanges *h*, formed upon the channel-irons H³ and H⁴, said flanges *h* being made of the same thickness as the sheathing O′, to enable the plates of the outer skin to be laid flat over the said sheathing and flanges.

The parts composing the revolving shells B, B′, and B² are constructed generally in the manner above set forth, the longitudinal beams N in this case, however, being placed outside of the ribs M, and the spaces between the said beams being filled by short segmental pieces or blocks M′, upon which and the outer faces of the said longitudinal beams N the outer sheathing or skin, P, of the shell is attached. The said sheathing P may be made either of wood or metal, but preferably the latter. The said shells B B′ B² are provided with a second or inner skin, P′, constructed with a wooden layer or sheathing, *p′*, formed of short boards or planks placed at their ends in rabbets *m* in the ribs M, and arranged to abut against marginal flanges *l* and *g* upon the channel-irons L² and the racks G G′ G², and with a second layer, *p*, forming the inner surface of the shell, and preferably made of sheet metal and applied over the sheathing *p′* in the same manner as before described in connection with the corresponding layer, *o*, of the skin O.

Both in the case of the hull and the tubular shells the main frame pieces or ribs H H′ H² and L L′ are made up of a series of layers, *h′ l′*, of bent wood, together with metal strips *h² l²*, constructed to project at their edges beyond the sides of the wooden layers, so as to form flanges for the attachment of the sheathing or skins O′ P′ and *o′ p′*. The metal strips *h² l²* will usually extend continuously around the

vessel, a portion of the layers in the wooden part of the ribs being cut out or removed to permit the passage of the longitudinal beams K and N.

In the parts A′ A² of the hull, in which the ribs H and I are constructed to sustain the outer skin flush with the outside of the tubular shells, as before set forth, the inner sheathing, *o′*, of the outer skin, O, is desirably continued at the same distance from the inner skin or sheathing, O′, outer layer, O, being in this case separated from the layer *o′*, as clearly shown in Fig. 4.

The inner sheathing, O′, is intended more especially as a means of bracing the frame and to form water-tight compartments between the frame-pieces of the hull, and a third layer or inner sheathing, O², will usually be laid in the lower part of the hull upon the inner surfaces of the ribs H H′ H² and supporting-pieces I², placed upon the ribs I I′, said inner sheathing, O², preventing the direct contact of the load with the sheathing O′, and forming a space to receive leakage or bilge-water.

One of the main ribs, H, in the part A′ A² of the hull is preferably arranged adjacent to the ends of the tubular shells B B′ B², as clearly shown in Figs. 2 and 4, and at the line of juncture between the hull and the end of the shell a practically water-tight joint is formed by means of a flange, *b*, upon the shell, which enters a groove formed by the marginal part of the outer metal sheathing, *o*, of the hull, which extends outwardly from the rib H, so as to overlap the said flange *b* and a cylindric flange, *b′*, attached to the said rib H inside of the flange *b*, said flange *b* being, as shown, formed upon a circular plate or ring, *b²*, attached upon the side face of the rib H. As an additional precaution against the ingress of water to the spaces between the tubular shells and the hull, plates or rings *b³* are placed over the joints between the channel-irons H³ and L², which are adjacent to the ends of the shell, said rings *b³*, as clearly shown in Fig. 7, being attached to the channel-irons H³, and constructed to bear at their outer portions against the faces of the moving channel-irons L².

In the case of the tubular shells B′ and B² at the ends of the vessel, the toothed bands or racks G′ G² are shown as located adjacent to the parts A′ A² of the hull; but in this case the rings *b²* may be applied to cover the joint between the margins of the said toothed bands and the opposing channel-irons L².

In the particular vessel herein shown, the portions Q Q′ of the bow and stern forward and at the rear of the tubular shells B′ B², instead of being made in the same manner as the remainder of the hull, are of lighter construction, the ends of the main part of the hull being closed by transverse walls or bulk-heads, so that in case the said lighter end parts of the vessel become injured or detached by collision or otherwise the main part of the vessel will float, and its safety will not be endangered.

In the particular construction of the parts illustrated the several longitudinal timbers K of the hull terminate in a circular metal beam, I⁴, to which is attached a suitable wall or bulk-head, I⁵, supported internally by suitable transverse beams, I⁶, Figs. 2 and 6. The said wall or bulk-head is preferably arranged in the same plane with the end faces or edges of the tubular shells B′ B², and in order to prevent access of water to the space between the shells and hull at this point each shell is provided with an inwardly-projecting metal flange, *b⁴*, as clearly shown in Fig. 6.

The parts Q Q′ of the hull may be constructed in any desired or preferred manner, said parts, as herein shown, being constructed with transverse ribs *g* and horizontal timbers *q′*, and provided with flat decks Q², and attached to the main part of the hull by extending the timbers *q′* through the bulk-head I⁵ and securing them to the main ribs H′ H′, adjacent to the bow and stern of the vessel. The bulk-heads I⁵ are desirably provided with openings *q²*, whereby access may be had to the decks of the parts Q Q′, said openings being provided with suitable doors or shutters, whereby they may be securely closed in case of necessity.

A desirable construction in the parts of the hull adjacent to the gear-wheels E is illustrated in Figs. 8 and 9, in which the openings through the hull for the said wheels are formed in a casting, E³, provided with a wide flange, E⁴, to which the ends of the ribs H² and I′ and the longitudinal beams K, which are necessarily cut to form said openings, are bolted. The said wheels E, E′, and E² and the circular racks G G′ G² are, as herein shown, provided with V-shaped teeth, to avoid any tendency to relative lateral movement in the said wheels and racks.

Inasmuch as there is liable to be some leakage into the space between the shells B, B′, and B² and the hull, suitable pumps will usually be provided for removing water from said space, a pump for this purpose being shown at R, Fig. 2.

As a preferred construction in the propeller-blades C, the latter are made relatively narrower and arranged side by side in spiral lines about the tubular shells, as clearly shown in Fig. 1. The blades may be made in any preferred manner, those herein shown being constructed of cast metal with lateral projections or flanges C, Fig. 10, at their inner ends, which are secured by rivets or bolts to spiral metal re-enforcing bands or plates C′, bolted or riveted to the shells.

The features of construction in the hull and in the separate bow and stern parts Q Q′, hereinbefore described, are made the subject of a separate application for patent, No. 185,543, filed by me upon the 14th day of December, 1885.

I claim as my invention—

1. A vessel made circular in cross-sectional form, and provided with an exterior revolving tubular shell having propeller-blades upon its outer surface, substantially as described.

2. A vessel made circular in cross-sectional form, and provided with two or more separate revolving tubular shells having propeller-blades upon their outer surfaces, the exterior surface of the vessel between the said tubular shells being flush with the exterior surfaces of the latter, substantially as described.

3. The combination, with a vessel made circular in cross-sectional form, of an exterior revolving tubular shell provided with propeller-blades upon its outer surface, and anti-friction rollers located between the vessel and the shell, substantially as described.

4. The combination, with a vessel made circular in cross-sectional form, and an exterior tubular revolving shell provided with propeller-blades, of anti-friction rollers interposed between the vessel and shell, and annular metal bands or rings upon the adjacent surfaces of the vessel and shell, affording bearings for the said rollers, substantially as described.

5. The combination, with a vessel made circular in cross-sectional form, and an exterior tubular shell provided with propeller-blades, of circular rack-bars upon the inner surface of the tubular shell, gear-wheels located within the vessel and engaged with the said rack-bars, and means for actuating said gear-wheels, substantially as described.

6. The combination, with a vessel made circular in cross-sectional form, and an exterior revolving tubular shell provided with propeller-blades, of interfitting annular flanges, and grooves upon the vessel and the ends of the shell, whereby influx of water between the parts is prevented, substantially as described.

7. The combination, with a vessel made circular in cross-sectional form, and an exterior revolving tubular shell provided with propeller-blades, of anti-friction rollers interposed between the vessel and the said shell, annular metal bands upon the vessel and shell, affording bearings for said rollers, and metal rings located in contact with and overlapping the joints between said bands, whereby passage of water between the said bands is prevented, substantially as described.

8. A vessel made circular in cross-sectional form, and provided with two or more separate exterior revolving tubular shells provided with propeller-blades, said vessel having horizontal decks located upon the parts of its hull between the said revolving shells, substantially as described.

9. The combination of a vessel made circular in cross-sectional form, an exterior tubular revolving shell, anti-friction rollers interposed between the vessel and the shell, and annular metal bands or rings L^2 and H^3, affording bearings for the rollers, the vessel being constructed with main ribs H′ H′, supporting said bands H^3, suitable intermediate ribs, as I′, and longitudinal beams, as K, substantially as described.

10. The combination of a vessel made circular in cross-sectional form, an exterior revolving tubular shell, anti-friction rollers interposed between the vessel and the shell, and annular metal bands or rings H^3 and L^2 upon the vessel and shell, affording bearings for the rollers, the vessel and shell being constructed with main ribs H′ H′ and L L, supporting said metal bands suitable intermediate ribs and longitudinal beams, substantially as described.

11. The combination of a vessel made circular in cross-sectional form, and exterior revolving tubular shell, anti-friction rollers interposed between the vessel and shell, annular metal bands or rings H^3 and L^2 upon the vessel and shell, toothed bands or annular rack-bars G upon the shell, and annular channel-irons upon the vessel opposite the said rack-bars, the vessel and shell being constructed with main ribs H′ H^2 and L′ L′, to sustain said bands, rack-bars, and channel-irons, and suitable intermediate ribs and longitudinal beams, substantially as described.

12. The combination, with a vessel made circular in cross-sectional form, of two or more exterior revolving tubular shells, anti-friction rollers interposed between the vessel and shells, and metal bands affording bearings for said rollers, the said vessel having parts A′ A^2 flush with the outer surfaces of the shells, and being constructed with main ribs H H in the said parts A′ A^2, main ribs H′ H′, supporting the said bands, and suitable intermediate ribs and longitudinal beams, substantially as described.

13. The combination, with a vessel made circular in cross-section, of an exterior revolving tubular shell provided with propeller-blades, anti-friction rollers interposed between the vessel and shell, and bands or rings H^3 upon the vessel, affording bearings for said rollers, the hull of the vessel being constructed with annular main ribs H′, supporting the bands H^3, and with intermediate ribs, I′, and having an outer skin, O, consisting of an inner layer, *o*′, of plank secured in rabbets in the outer surfaces of the ribs I′, and constructed to abut against the bands or rings H^3, and an outer layer, *o*, of sheet metal, extending over the said inner layer and the intermediate ribs between the said bands, substantially as described.

14. The combination, with a vessel made circular in cross-sectional form, of an exterior tubular revolving shell provided with propeller-blades, and having an interior toothed band or rack-bar, and gear-wheels E, within the vessel, engaging the rack-bar, the hull of the vessel being constructed with circular ribs and longitudinal beams, and provided with an aperture for the said wheel, and a flanged metal casting, E^3, surrounding the aperture,

and affording attachment for the adjacent ends of the said ribs and beams, substantially as described.

15. The combination, with a vessel made circular in cross-sectional form, of an exterior revolving tubular shell provided upon its exterior surface with a series of relatively short propeller-blades arranged side by side in a spiral course about the shell, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

CHARLES M. CATLIN.

Witnesses:
M. E. DAYTON,
G. F. LANAGHEN.