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SCREW PROPELLED VESSEL.

No. 520,691. Patented May 29, 1894.

Fig. 1.

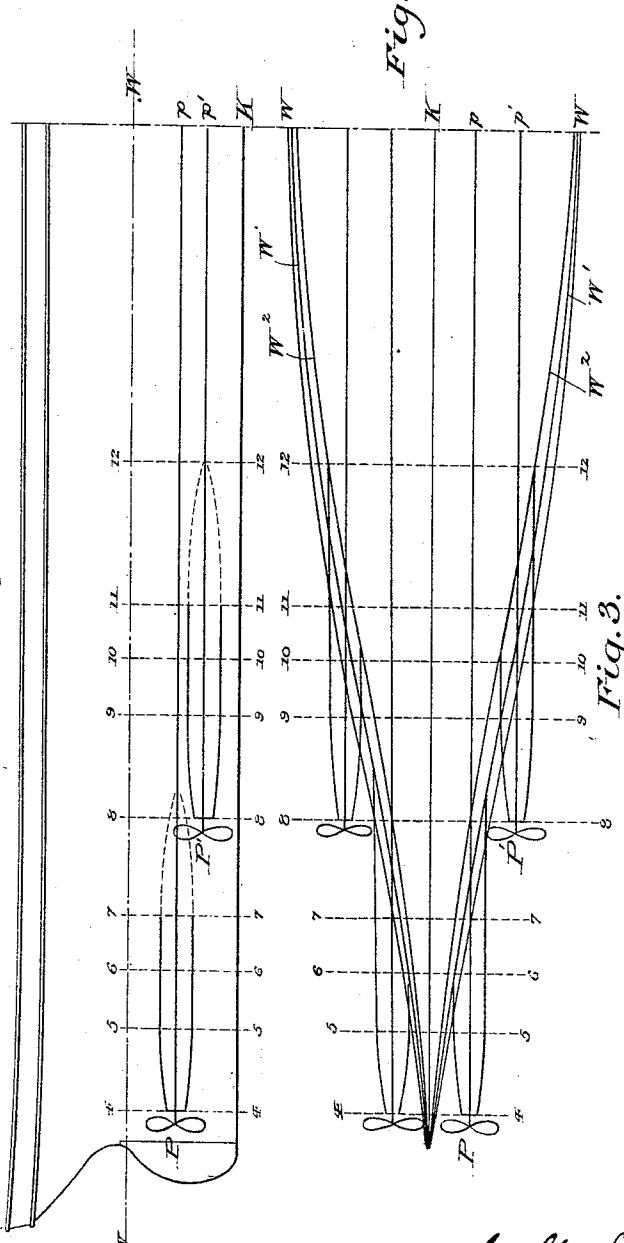
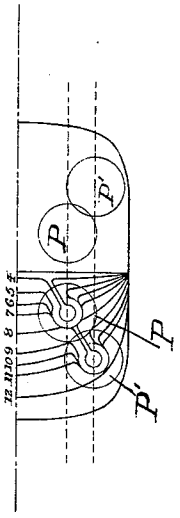


Fig. 2.

Fig. 3.



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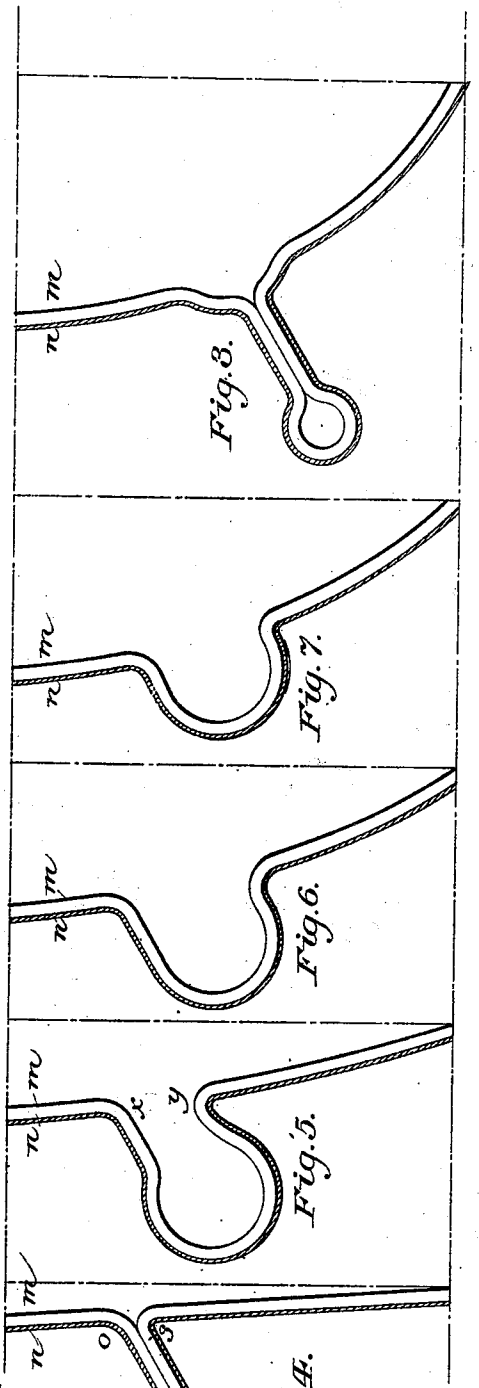

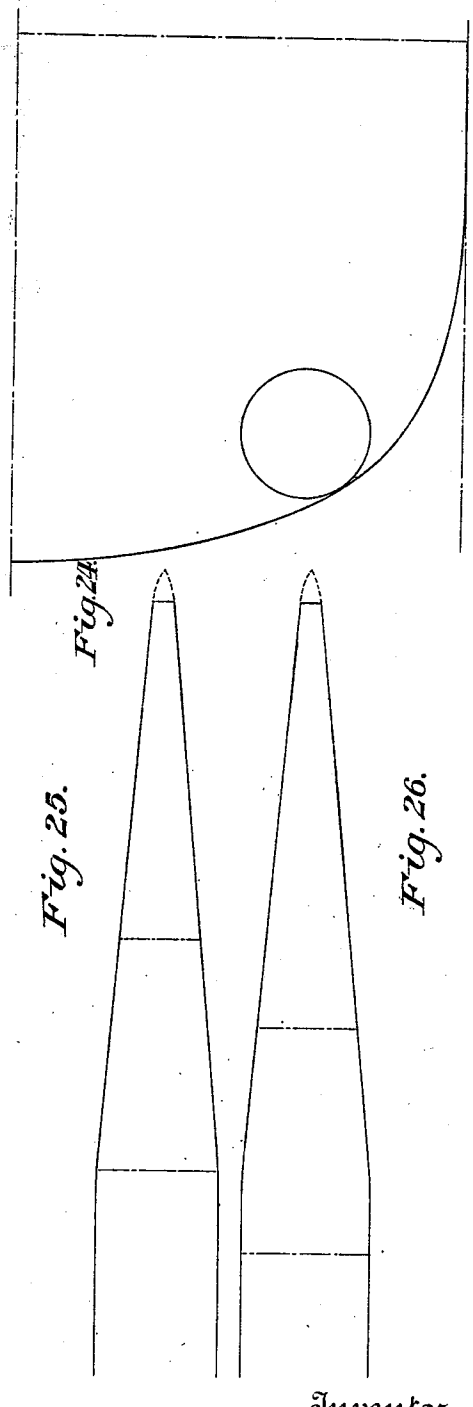

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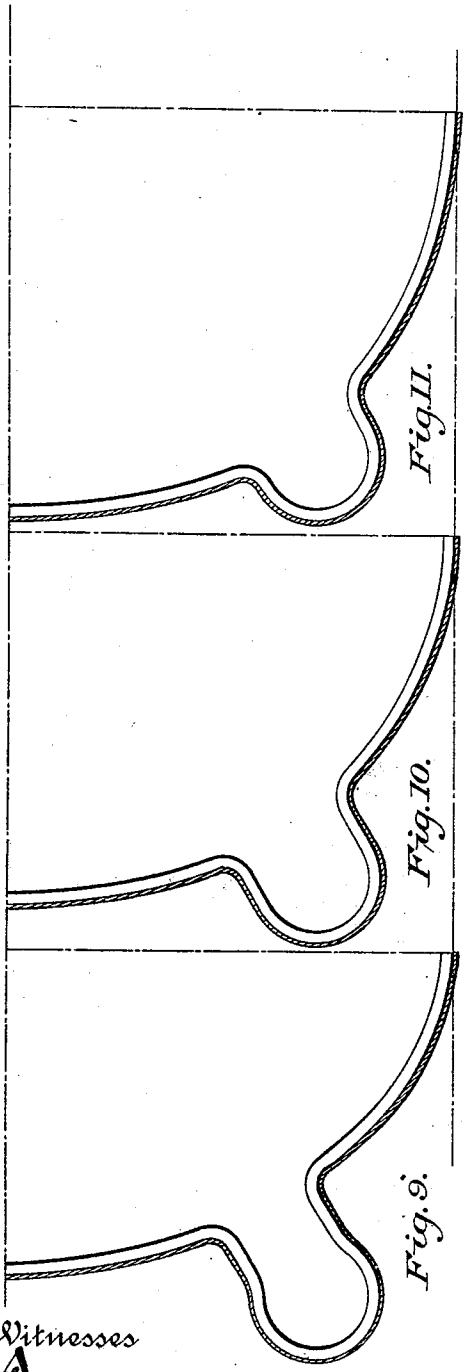

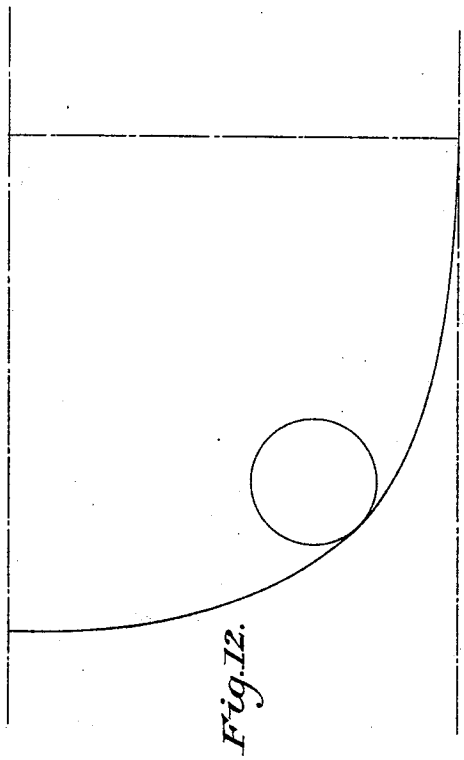

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SCREW PROPELLED VESSEL.

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Fig. 13.

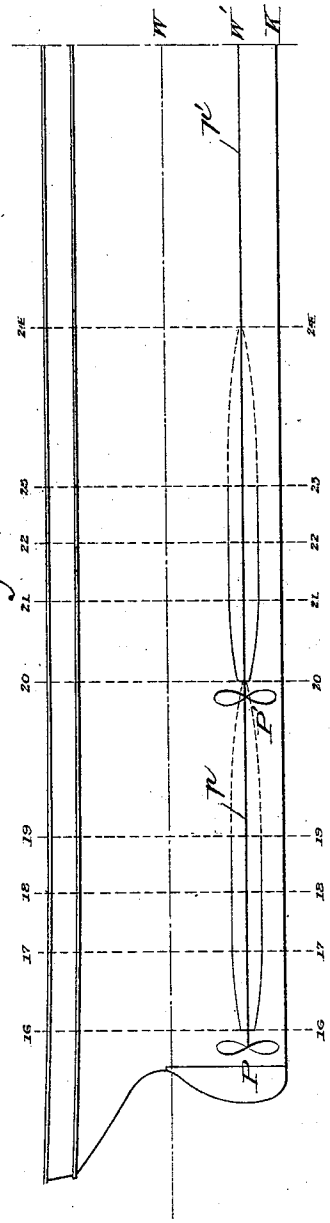


Fig. 14.

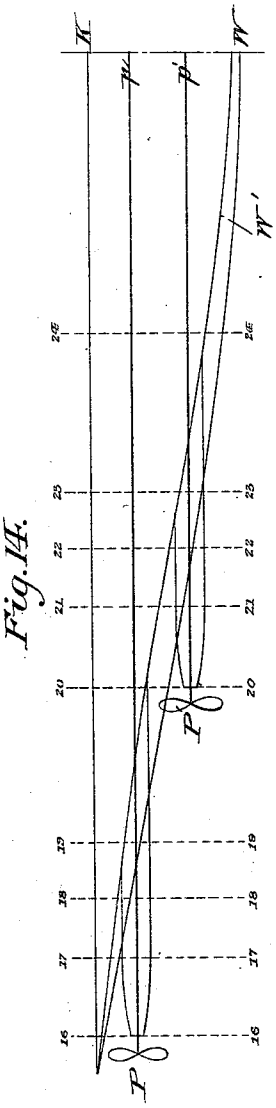
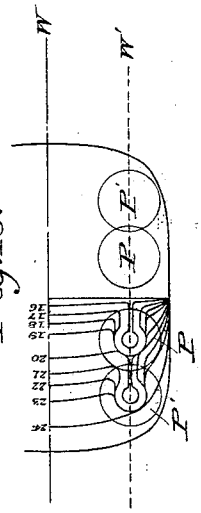


Fig. 15.



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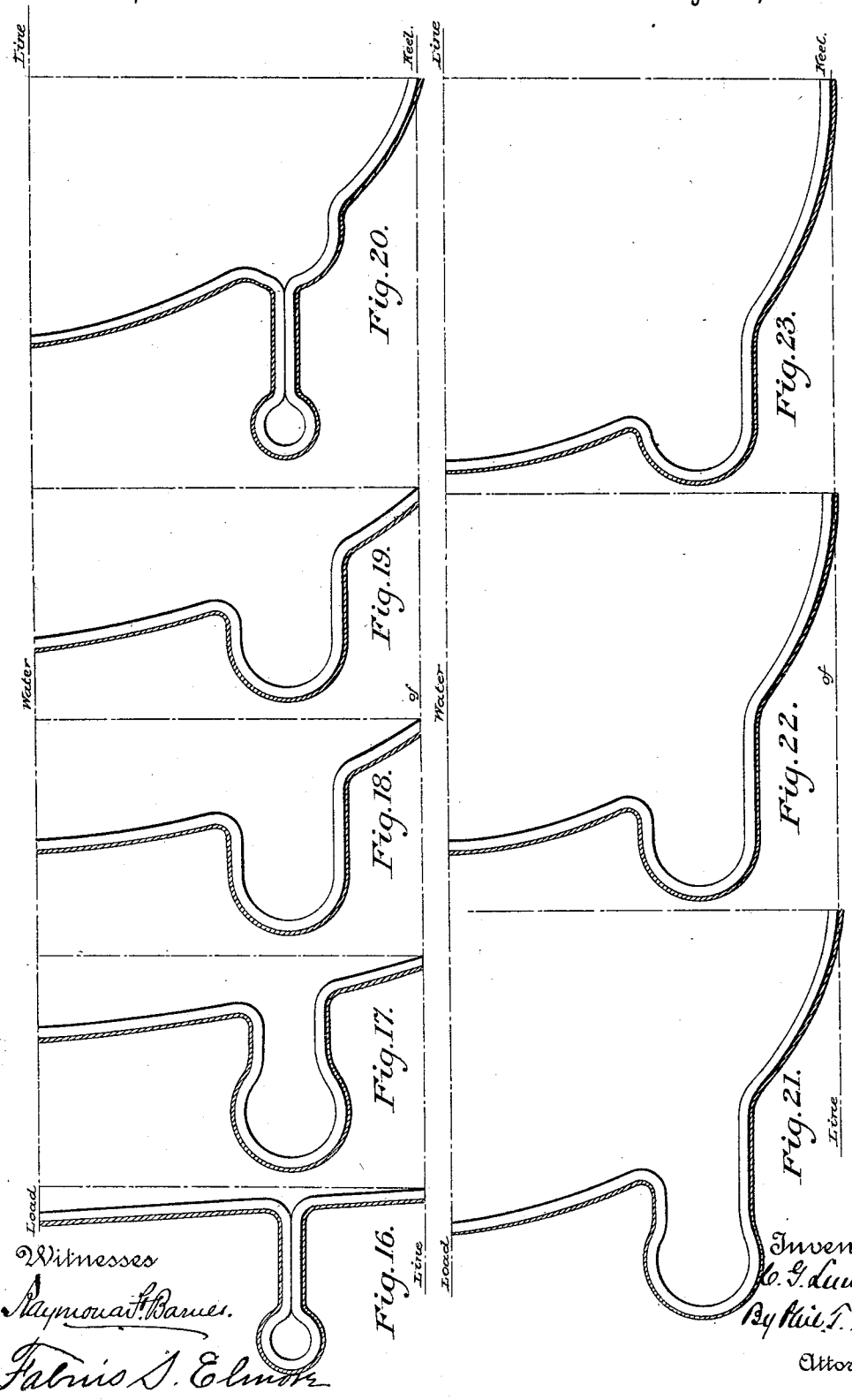

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UNITED STATES PATENT OFFICE.

CHARLES G. LUNDBORG, OF PHILADELPHIA, PENNSYLVANIA.

SCREW-PROPELLED VESSEL.

SPECIFICATION forming part of Letters Patent No. 520,691, dated May 29, 1894.

Application filed January 6, 1893. Serial No. 457,566. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. LUNDBORG, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Screw-Propelled Vessels, of which the following is a specification.

The great engine power necessary to produce the high speed of the ocean passenger steamship of the present day, concentrated as that power usually is, upon one or two propellers at a point near the stern of the vessel, must necessarily produce a great vibration throughout the structure causing discomfort to the passengers and increased wear and tear of all the moving parts, while the growing desire for still higher speed and more rapid communication across the ocean, demands vessels with yet greater engine power, which, acting upon propellers placed in the ordinary position would greatly increase the racking motion and its evils.

In Letters Patent No. 452,108, dated May 12, 1891, I have described a method of applying great aggregate engine power upon multiple propellers, in combination with two or more central stern-posts at different points in the length of the vessel, the shafts of the propellers situated outside of the middle line of the hull being sustained in the water where they project beyond the hull, in the ordinary manner by struts or brackets.

By the present invention I produce a firm and unyielding support for all propeller-shafts whatever their number and position without the aid of struts or analogous supports external to the hull.

The invention also enables me to so modify or dimish the vibratory motion by an advantageous arrangement or location of the propellers that the great aggregate engine power will act upon the hull of the ship at points widely separated from each other, and with a very advantageous effect.

Under the improved construction I project the propeller shafts rearward through trunks or tunnels built into and forming an integral part of the hull, these tunnels being formed by bending the ship's frames outward in suitable forms the forms being gradually changed as the stern is approached so as to reduce the sectional size of the tunnels and permit the free run of the water to the propellers. Certain of the frames are bent so as to give form to two tunnels for two shafts lying in different planes on the same side of the vessel.

For the purpose of a full and complete explanation reference may be had to the accompanying drawings forming part of this specification.

Figure 1 is a side elevation of the after part of the vessel provided with four propellers in accordance with my invention. Fig. 2 is a top plan view of the same showing not only the location of the tunnels and screws, but the horizontal water lines at different levels. Fig. 3 is a rear elevation showing the outline of the hull at its greatest transverse section below the water line with the outline of the four propellers projected thereon, and also the outline of the frames or ribs of the vessel, the different vertical planes correspondingly numbered in Figs. 1 and 2. Figs. 4 to 7 represent cross sections of the hull on one side on the correspondingly numbered lines of Figs. 1 and 2 showing the shape which the tunnel for the shaft of the after propellers assumes at different points in its length. Figs. 8, 9, 10 and 11 are cross sections on the correspondingly numbered lines of Figs. 1 and 2 showing the shape of different points of the tunnels carrying one of the forward propeller shafts. Fig. 12 is an outline cross-section of the hull at the point where the tunnel of the forward propeller begins to emerge from the hull sternward. Figs. 13 and 14 are respectively a side elevation and a top plan view of the after part of a hull in modified form in accordance with my invention. Fig. 15 is a cross-section of the same at the point of greatest transverse section with the outline of the propellers projected thereon and showing also the outline of the frames or ribs on the correspondingly numbered section lines of Figs. 13 and 14. Figs. 16 to 23 are cross sections on the correspondingly numbered lines of Figs. 13 and 14 through one side of the vessel showing the form of the shaft-receiving tunnels and the frames by which they are formed. Fig. 24 is a view similar to Fig. 13, but showing the tunnel somewhat higher above the keel. Figs. 25 and 26 are outline views showing the contraction of the respective tunnels toward the

rear ends whereby the water is permitted to close inward around the tunnels toward the axes of the propellers as it approaches the latter.

In Figs. 1, 2, 3, 13, 14 and 15 P represents two propellers in the ordinary position near the stern of the vessel and on opposite sides of its middle line, and P′ two propellers one on each side of the middle line of the vessel situated at a considerable distance forward of those first named. The propeller shafts connecting the propellers with the engines which may be of any suitable form and arrangement are represented by p, p'. W W is the load water line; K the keel or bottom of the vessel; and W′ and W² are water lines on the horizontal level of the axis of the respective propellers.

On referring to Figs. 3 and 4, the latter of which represents the cross section of the hull on the line 4—4 Figs. 1 and 2; m and n represent the inner and outer edges of the frames. It will be seen that the frames at the point o are bent outward to a point q so as to surround the shaft and form the after end of the shaft tunnel, t, through which the shaft, p, projects to carry the propeller. The inner edge of the frame after encircling the shaft and nearly completing the circuit of the tunnel meets the inner edge of the same projecting frame at a point, r, and continuing toward the middle line of the vessel to a point, s, again bends and continues to the keel or bottom of the vessel in its ordinary form.

On examining Figs. 3 and 5 the latter of which represents a section of the hull on the line 5—5 Figs. 1 and 2, it will be seen that the frame is bent outward in a manner somewhat analogous to that of the frame above described so as to encircle the shaft and give support to the walls of the tunnel through which it extends. The edges of the outwardly bent portion of the frame instead of being brought together again inside of the shaft are separated so as to leave between them a space x—y, through which access may be had to the shaft from the interior of the hull.

The frames on the lines 6—6, 7—7, 8—8 assume the form shown in the corresponding figures of the drawings. Each of the frames for the after propeller shaft projecting beyond the hull a less distance than the one next astern. The frame on the line 8—8 is not only adapted to encircle the after end of the shaft of the forward screw and form the after end of its tunnel, but is also bent to form the rudimentary tunnel or, in other words, the forward end of the tunnel for the shaft of the after screw, where it begins to emerge through the hull. It will be observed that the frame of Fig. 8 is bent to give form to two tunnels for the two shafts in different vertical and horizontal planes. The frames on the lines 9, 10 and 11 are of the forms shown in the the corresponding figures of the drawings being each adapted to encircle the forward shaft and to give form to a tunnel inclosing the shaft but open and communicating with the interior of the hull on the inner side.

It will be observed that in the above described views the two after screws are located at a higher level and nearer the center line of the vessel than the others, and that the tunnels are projected from the hull outward and somewhat downward. It will also be noticed that each of the tunnels tapers or diminishes in size in cross section as it approaches the stern until finally it terminates in an end portion closely encircling the shaft thus allowing the water a free and easy run to the propeller.

In the modified form of hull shown in Figs. 13 to 24 the four propeller shafts are in the same horizontal plane, the two after shafts being located nearer the center line of the vessel than the other. The frames at the points indicated by the various section lines of Figs. 13 and 14 are bent outward to give the requisite form to the respective tunnels at different points in their length. The frame on each side at the line 20 is adapted to give form to the tunnels for both shafts, that is, to encircle the after ends of the forward shaft and to swell slightly outward to make room for the forward end of the after shafts at the point where they come for the first time wholly within the hull body. By this modification the after propellers may be placed at so great a depth below the surface of the water as to practically prevent "racing" in any weather. The forward propellers being placed far ahead of the stern cannot "race" under any conditions.

Figs. 25 and 26 indicate the longitudinal contraction or taper of the respective tunnels showing the manner in which the water is permitted to close inward around the tunnels and toward the center line of the propellers as it approaches them.

Having thus described my invention, what I claim is—

1. A vessel hull having its frames or ribs bent to form on each side a plurality of tunnels for propeller shafts, one or more of said frames on each side bent to give form to all the tunnels and all the frames conforming below said tunnels to the lines of lateral contraction toward the stern.

2. A hull for a steam vessel in which frames of the after part of the hull, on each side, are bent between the keel and the water line to form the outline of two or more tubes or tunnels for the reception of propeller shafts.

3. A hull for a steam vessel provided on each side between the keel and the water line with a plurality of propeller shafts, and a corresponding number of tubes or tunnels built integral with the hull and having their inner sides open and communicating with the interior of the hull.

4. A vessel's hull having at the sides of the tapering stern portion tunnels for the propeller shafts formed by bending the ribs outward, the ribs above and below said bent por-

tions conforming to the lines of lateral contraction toward the stern.

5. A vessel's hull having at each side of the tapering stern portion a plurality of tunnels for the propeller shafts, said tunnels formed by bending the ribs outward, the front end of one tunnel overlapping the rear end of the other, and the ribs conforming above and below said tunnels to the lines of lateral contraction.

6. A vessel's hull having at each side of the tapered stern portion a plurality of tunnels for the propeller shafts, said tunnels formed by bending the ribs outward and being in different longitudinal vertical planes, the rear end of one tunnel overlapping the front end of the other, and the rib or ribs at the overlapping points being bent to conform to both tunnels.

In testimony whereof I hereunto set my hand, this 22d day of November, 1892, in the presence of two attesting witnesses.

CHARLES G. LUNDBORG.

Witnesses:
PHIL. T. DODGE,
W. R. KENNEDY.