No. 687,910. Patented Dec. 3, 1901.

J. S. WATTERS.

CONSTRUCTION OF VESSELS.

(Application filed Apr. 12, 1900. Renewed Apr. 29, 1901.)

(No Model.)

Fig. 1.

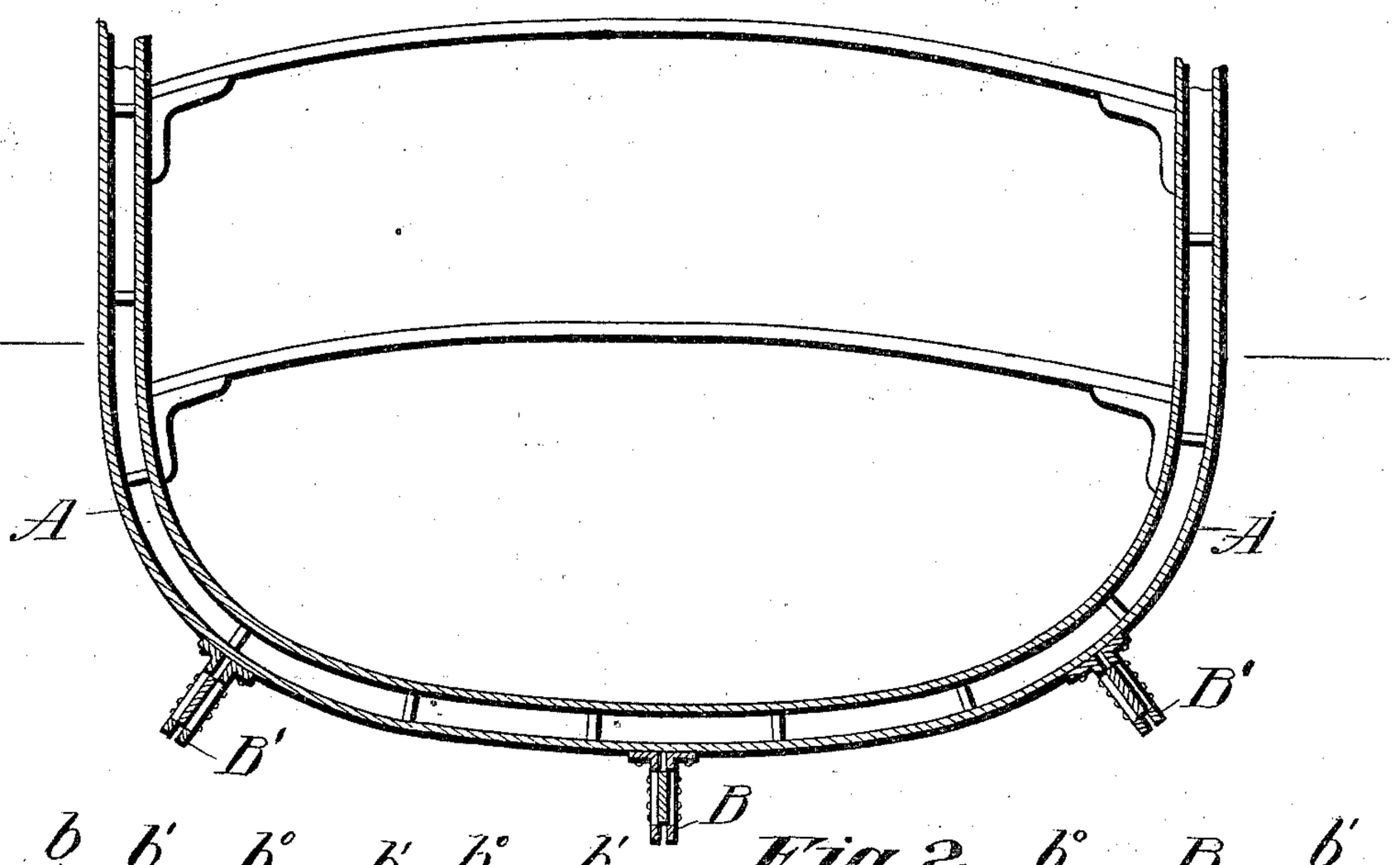


Fig. 2.

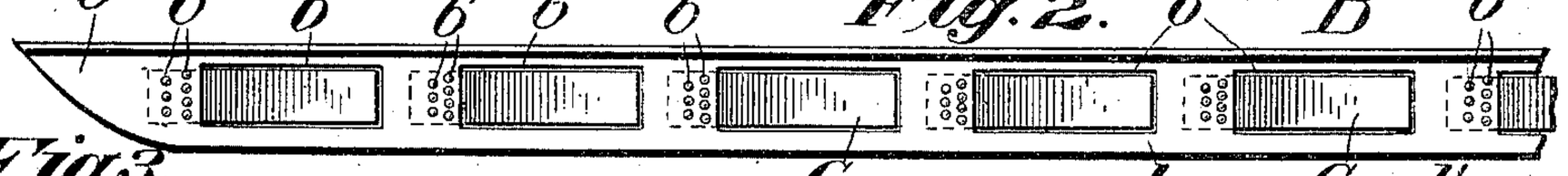


Fig. 3.

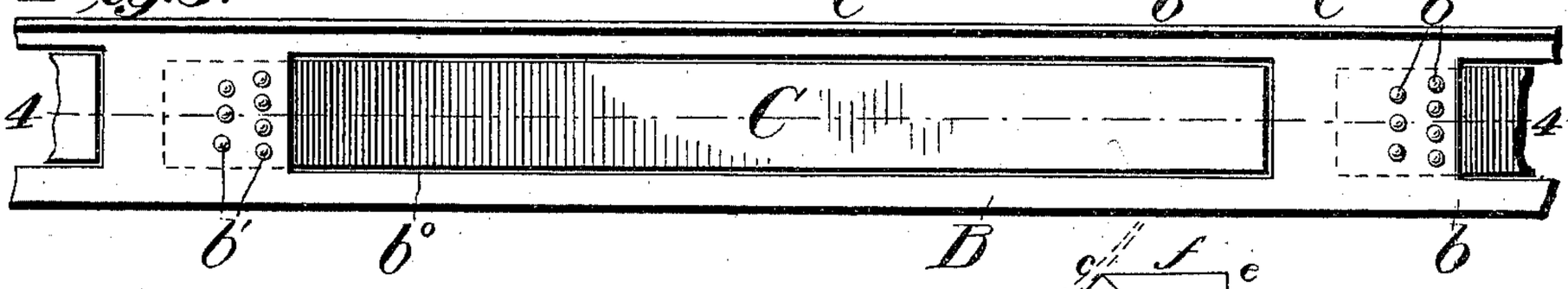


Fig. 4.

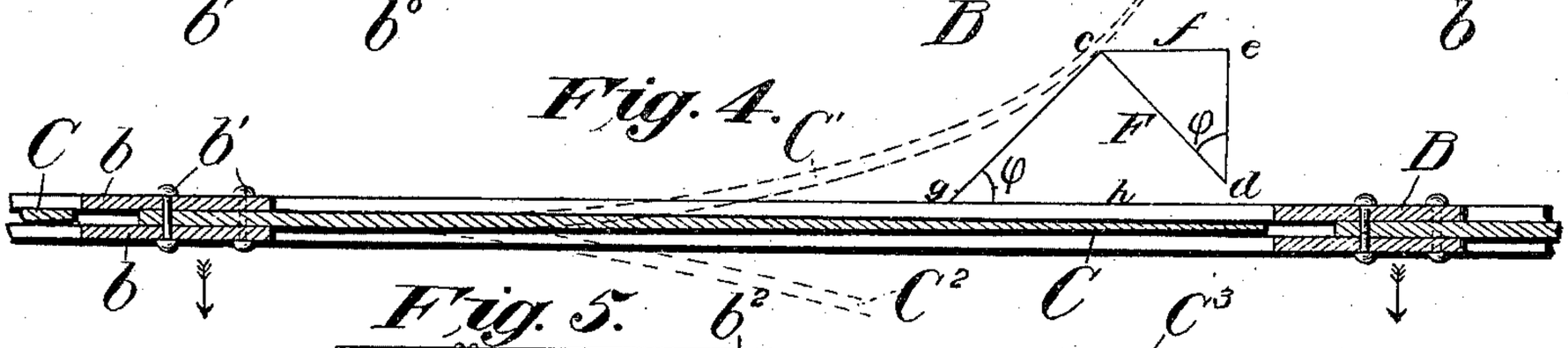
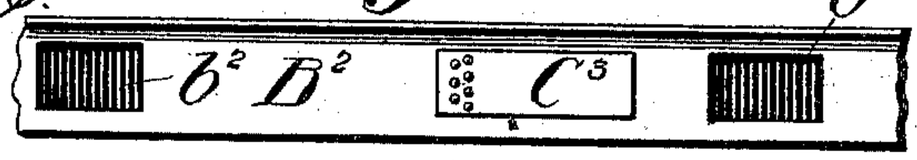


Fig. 5.

Fig. 6.



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CONSTRUCTION OF VESSELS.

SPECIFICATION forming part of Letters Patent No. 687,910, dated December 3, 1901.

Application filed April 12, 1900. Renewed April 29, 1901. Serial No. 58,062. (No model.)

To all whom it may concern:

Be it known that I, JOHN SPROSTON WATTERS, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in the Construction of Vessels; 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.

My invention relates to improved automatic apparatus whereby the rolling motion of the ship is partly converted into a fore-and-aft motion, by means of which a part of the rolling energy of the vessel in a seaway is converted into a forward motion, causing the vessel to forge ahead if she be lying in a calm and assisting in the speed of the vessel if she is under way.

My invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 represents diagrammatically the midship section of a vessel provided with my invention. Fig. 2 represents a side elevation of a part of one of the keels fitted with one form of my invention. Fig. 3 is an enlarged detail view of a portion of the keels shown in Fig. 2. Fig. 4 represents a section along the line 4 4 of Fig. 3 and looking down, and Figs. 5 and 6 are details of a modified form of the invention.

A represents the skin of the ship, which may be provided with a single keel B or with bilge-keels B′, and the number of keels may be increased, if desired. The keels are preferably each constructed of two plates *b*, secured together in any convenient way and provided with a plurality of openings *b o*, in which openings project the spring-tongues C, which tongues are flush-riveted at their forward end, as at *b′*, to the said plates *b*, while the rear end of the tongue—that is, the end toward the stern of the ship—is preferably made tapered somewhat, as shown in Fig. 4. These tongues C may be made of one piece or laminated. In the latter case the central plate will be the longest, the taper being obtained by shortening the plates successively toward the exterior plate on each side, all being riveted through and through at their forward ends to the plates *b*. By referring to Fig. 4 it will be seen that if the keel be rolled in the direction indicated by the arrows the resilient tongue C will be bent outward, as indicated by dotted lines C′, while if the keel rolls in the opposite direction the resilient tongue will be forced out by the pressure of water in the direction indicated by the dotted lines C^2. Assuming that the tongue C is pressed out to the position shown at C′ in Fig. 4, the force acting at any point of the resilient tongue—as, for instance, the point *c*—may be indicated by the line *c d* normal to the surface of the tongue. Calling this force F, it may be resolved into its two components—*e d*, tending to oppose the rolling of the ship, and *e c*, tending to force the ship forward. This latter force we will call *f*, and by examination of the triangle *c d e* we will find that $f = F \sin \phi$. The angle ϕ, it will be seen, is the same angle that the surface of the resilient tongue at *c* if prolonged to *g* would make with the keel, and therefore we have the general formula that the resultant force *f*, acting on a limited area of the resilient tongue, would be equal to the total pressure on that area multiplied by the sine of the angle that the surface of that area makes with the keel. Since the curve of the resilient tongue varies, the total resultant force tending to force the vessel forward as it rolls will be made up of the sum of the various resultants acting upon the different parts of the resilient tongue. By increasing the number of these tongues and making them sufficiently resilient a considerable forward component of the rolling force may be obtained. It will be obvious that this forward component will vary with both the resiliency and the number of these tongues, and therefore several keels and a sufficient number of tongues should preferably be used. Another effect of these resilient tongues would be to ease the vessel as it rolls, avoiding a large part of the sudden jerks and strains which are thrown on the keels of a vessel when she is rolling heavily. Thus the tendency of these spring-tongues in the various keels will be to diminish rolling and steady the ship It will be seen that

these resilient tongues will not be likely to get clogged up with seaweed, barnacles, or the like, but will tend to automatically clean themselves.

Although I prefer the form of device shown in Figs. 1 to 4, the apparatus may be constructed as shown in Figs. 5 and 6, where the keel B^2 is shown as made of wood and provided with "staggered" inclined passages b^2, each closed by a spring C^3. In this form of the device the springs will act in one way only and will not be double-acting when the ship rolls in either direction, as would be the case with the device shown in Figs. 1 to 4; but the inclined surfaces b^3 at the front of the passages b^2 will tend to wedge the vessel forward as she rolls.

It will be evident that the keel or keels need not necessarily extend the whole length of the vessel, but may extend throughout a part only of its length, as along the rear portion of the hull, like the skeg of an ordinary skiff, or along the bilges, or under the counter. Moreover, the number of keels or of webs or fins forming incomplete keels may be varied at will, as may also the angle at which the web, fin, or keel is placed. Thus one web, fin, or keel may be vertical, like the main keel of a vessel, another may be horizontal, another set at an incline to the vertical, like the ordinary bilge-keels, and so on; but in order to secure the forging-ahead effect of the resilient tongues the webs, fins, or keels should preferably all run fore and aft or approximately fore and aft of the vessel. Thus all the webs, fins, or keels that run fore and aft, as indicated, will help the boat ahead if they be immersed while the boat is rolling, while the horizontal or approximately horizontal webs, fins, or bilge-keels or parts of keels will help the boat ahead while pitching, and in either event the cushioning effect of the resilient tongues will check the violence of either the rolling or pitching motion of the vessel.

Various modifications of the herein-described invention might be made which could be used without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination with the hull of a vessel, of the keel secured thereto, apertures transversely disposed in said keel, and resilient tongues secured at their forward end to said keel and projecting rearwardly into said apertures, substantially as described.

2. The combination with the hull of a vessel, of a plurality of keels provided with transverse apertures, and resilient tongues secured at one end in front of said apertures and projecting rearwardly into said apertures, and having the rear end free, substantially as described.

3. The combination with the hull of a vessel, of a keel made of two parallel plates secured thereto and provided with transverse apertures, of a plurality of resilient tongues bolted between said plates and having their rear ends free and projecting into said apertures, substantially as described.

4. The combination with the hull of a vessel, of a plurality of keels, each made of two plates with transverse openings therethrough, and a plurality of resilient tongues bolted between said plates and projecting rearwardly into said apertures with their rear ends free, substantially as described.

5. The combination with the hull of a vessel, of the keel secured thereto, apertures transversely disposed in said keel, and resilient tongues, tapering as shown, secured at their forward end to said keel and projecting rearwardly into said apertures, substantially as described.

6. The combination with the hull of a vessel, of a plurality of keels provided with transverse apertures, and resilient tongues, tapering as shown, secured at one end in front of said apertures and projecting rearwardly into said apertures, and having the rear end free, substantially as described.

7. The combination with the hull of a vessel, of a keel made of two parallel plates secured thereto and provided with transverse apertures, of a plurality of resilient tongues, tapering as shown, bolted between said plates and having their rear ends free and projecting into said apertures, substantially as described.

8. The combination with the hull of a vessel, of a plurality of keels, each made of two plates with transverse openings therethrough, and a plurality of resilient tongues, tapering as shown, bolted between said plates and projecting rearwardly into said apertures with their rear ends free, substantially as described.

9. The combination with the hull of a vessel, of one or more webs, fins or keels running longitudinally and secured to the outer portion of said hull, with apertures in said web, fin or keel, and resilient tongues, each secured at its forward end to said web, fin or keel, and projecting rearwardly into said apertures with its rear end free, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN SPROSTON WATTERS.

Witnesses:
R. L. GWINNER,
W. B. MERCIER.