

(No Model.)

J. GROTHGAR & J. M. GARFIELD.
KEEL.

No. 468,339.

Patented Feb. 9, 1892.

Fig. 1.

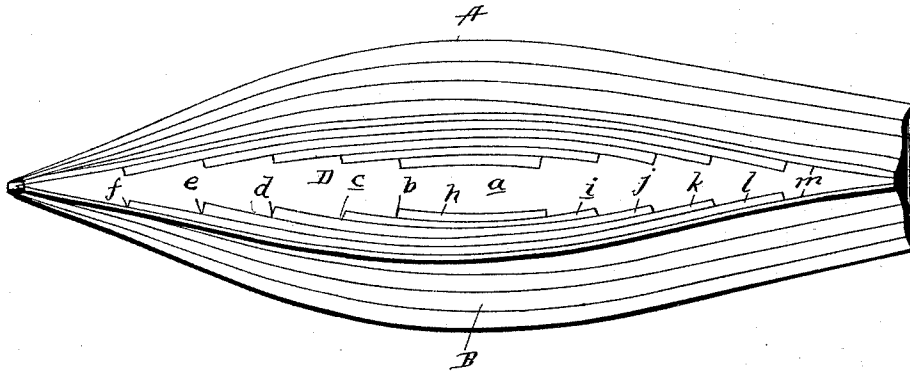
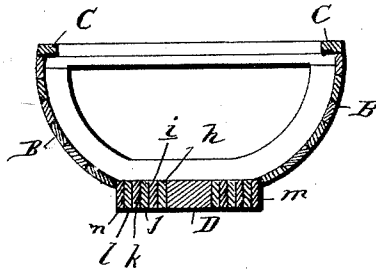


Fig. 2.



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JOHN GROTHGAR AND JOHN M. GARFIELD, OF GALVESTON, TEXAS.

KEEL.

SPECIFICATION forming part of Letters Patent No. 468,339, dated February 9, 1892.

Application filed March 4, 1891. Serial No. 383,666. (No model.)

To all whom it may concern:

Be it known that we, JOHN GROTHGAR and JOHN M. GARFIELD, citizens of the United States, residing at Galveston, in the county of Galveston and State of Texas, have invented certain new and useful Improvements in Keels; and we do 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.

Our invention has relation to improvements in the construction of vessels; and it has for its object, among other things, to provide a construction of vessel embodying a peculiar keel, through the medium of which the distance between the keel and covering-boards is equalized throughout the length of the vessel and a vessel of exceptional strength and advantageous construction is afforded.

The improvements will be fully understood from the following description and claims, when taken in connection with the accompanying drawings, in which—

Figure 1 is an inverted plan view of our improved vessel; and Fig. 2 is a vertical cross-section of the same, taken about amidship.

Referring by letter of designation to the said drawings, A indicates the frame of our improved vessel, and B indicates the planking, while C indicates the covering-boards, all of which may be of any ordinary or approved construction and material.

D indicates the longitudinal center strip of our improved keel, which may be of any approved width and thickness and extends the full length of the vessel, being connected to the vessel-frame in any approved manner. This center strip D is reduced in width for a portion of its length at its middle, as indicated by *a*, and the edges of this reduced portion are curved slightly outward, as illustrated in Fig. 1. At the respective ends *b* of the reduced portion *a* and at the points indicated by *c*, *d*, *e*, and *f* the center strip is stepped laterally or outwardly, for a purpose presently to be explained, and the edges of the strip between the several steps are curved slightly, as illustrated, and taper generally toward its respective ends, where tapered portions *g* are formed.

h, *i*, *j*, *k*, *l*, and *m* indicate the respective auxiliary curved strips, which serve, in con-

junction with the longitudinal center strip D, to form my improved keel. The curved auxiliary strips are set side by side on edge, as better illustrated in Fig. 2 of the drawings, and are attached to the edges of the longitudinal center strip D and to each other by any ordinary or approved means, their arrangement being as follows: The short strips *h* occupy the space between the steps or shoulders *b*, the strips *i* the space between the steps *c*, the strips *j* the space between the steps *d*, the strips *k* the space between the steps *e*, the strips *l* the space between the steps *f*, and the strips *m*, which form the outer edge of the keel, are attached to the tapering edges of the pointed portions *g*. By this arrangement and attachment of the auxiliary strips to the longitudinal center strip and to each other it will be seen that a sectional keel is provided in which all the joints are broken, whereby exceptional strength and durability is afforded.

It will further be seen that by our improvements a vessel is enabled to carry more cargo to its tonnage than when an ordinary keel is used, for it will be seen that our improved keel decreases the draft of the vessel. Furthermore, by the employment of our improved keel it will be seen that a saving of labor and material is effected by reason of the distance between the keel and covering-boards being equalized throughout the length of the vessel, for by this means it will be seen that straight timber may be employed for planking the vessel and it is simply necessary to set the planks parallel to each other.

Although we have minutely described our improved keel, it is obvious that in practice such changes in the construction and arrangement of the parts may be made as fairly fall within the scope of our invention.

Although we have illustrated our improvements as forming a flat keel, yet it is obvious that in practice the longitudinal center strip and the auxiliary strips might be so formed and connected as to constitute a keel having more or less dead-rise, as the latter form of keel is generally preferable.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. An improved keel for vessels, comprising a longitudinal center strip having its edges

stepped at intervals in its length, and auxiliary strips of different lengths, attached to the edges of said center strip between the steps thereon, substantially as specified.

- 5 2. The combination, with a vessel-frame, of a longitudinal center strip attached thereto, said strip being reduced in width for a portion of its length at its middle and having its edges stepped at intervals in its length on
10 either side of the reduced middle portion, and the auxiliary curved strips of different lengths,

attached to the edges of said center strip between the steps thereon, substantially as specified.

In testimony whereof we affix our signatures 15
in presence of two witnesses.

JOHN GROTHGAR.
J. M. GARFIELD.

Witnesses:

JAMES B. STUBBS,
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