Improved Plan for constructing Ships.

Notwithstanding the present great difficulties experienced in keeping the bottoms of iron vessels clean, and protecting the iron plates against corrosion, ships of that description are increasing in number every year, showing that they have advantages over wooden vessels of such importance that, if these difficulties could be overcome, iron ships would entirely supersede the wooden ones, at least with regard to vessels of war, large ocean-going steamers, and sailing vessels. Many experiments have been tried with different kinds of paints and coatings to protect iron plates against accumulating dirt and rust; but as yet without any promising result.

It is therefore obvious that the use of iron as a material in ship-building should be confined to places where moisture cannot injure it, and yet have its great quality—strength—applied to the best advantage.

The mode of construction proposed by the inventor is to combine iron and wood together in such a manner that the iron forms the inner and principal structure, and is strengthened and protected by a water-tight wooden casing outside.

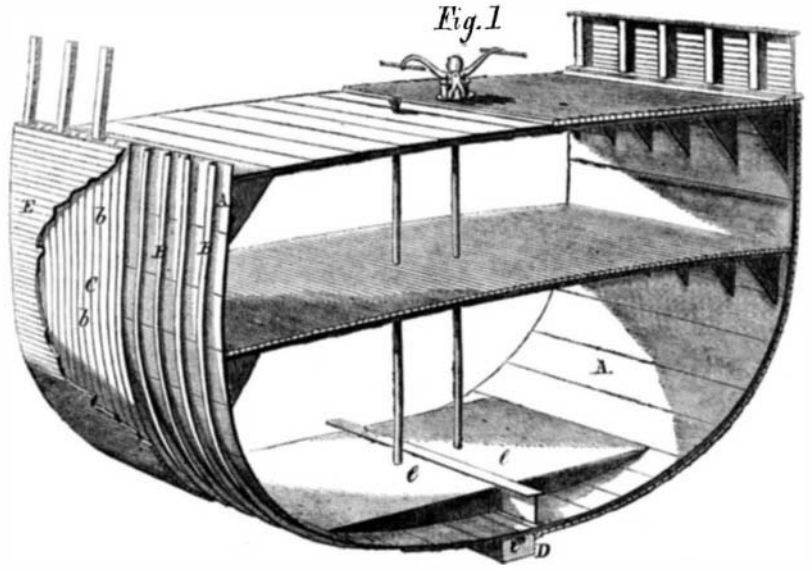
A represents the iron shell of the vessel, which is riveted together in the usual manner, and fastened with bolts and nuts on frames temporarily put up inside, so that the whole iron shell may be shaped to its proper form before the outside frames, B, are fastened to the plating, A. The frames, B, are made of angle iron with flanges on the inside only, or with flanges inside and outside, which latter shape, in most cases, will be preferable. The spaces between the frames, 16 to 18 inches, are fitted in with timbers, C. This filling consists of two timbers between each frame, bolted to the frame and to each other as at *a*, in Fig. 2. The timbers will be fitted to the frames and bored before these are fastened in their places. The two mid-ship frames are to be reversed and bolted together on the ground, with the filling timbers between them; in this way the inside flanges will on one frame show forward, and on the other side show aft; the flanges being riveted to the plating the next timber on each side should be bolted to these frames, and this done, the second frame with its corresponding timber should be secured as the first, *a sf*. By this proceeding there will always be ample room for driving the bolts. The temporary frames must be removed in succession as the outside ones are put up, and the same holes in the plating used for both.

A space of about $\frac{1}{4}$ of an inch should be left between the inner surface of the timbers and the outer surface of the plating. This space will be filled with soft pitch to a hight of some feet over the turn of the bilge, said pitch to be poured in hot through holes bored in the timbers at convenient intervals, and the holes afterwards plugged with treenails. The space above this line can be filled with felt saturated with coal tar. The timber-filling extends beyond the outer flanges or edges of the frames, is dovetailed and calked in the seams. A groove, *b*, is cut in each seam as shown in Figs. 1 and 2. These grooves will be cut, before the seams are calked, about 1 inch deep and 2 inches wide, they lead down to a channel, *c*, cut out in the bottom of the timbers, C, and in the keel, D, as far as practicable, extending throughout the entire length of the vessel.

From this channel, pipes of copper or other suitable material extend to a cistern, *e*, placed in the bottom of the ship, and having attached to it a pump, by the action of which the water as well as foul air accumulating in said cistern can be removed whenever it may be necessary.

To the outside of the timbers, C, a planking, E, is fastened by composition nails and calked. Any water or moisture which may find its way through the seams

Fig. 1



HEIN'S PLAN FOR CONSTRUCTING SHIPS.

of the planking will pass through the grooves, *b*, down to the channel, *c*, and thence to the cistern, *e*, where it will be removed by the pump. By this arrangement it will be seen that no water can accumulate in the hold of the vessel under ordinary circumstances, as it has to pass first through the calking of the timbers, then through the pitch between them and

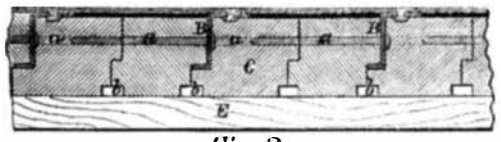
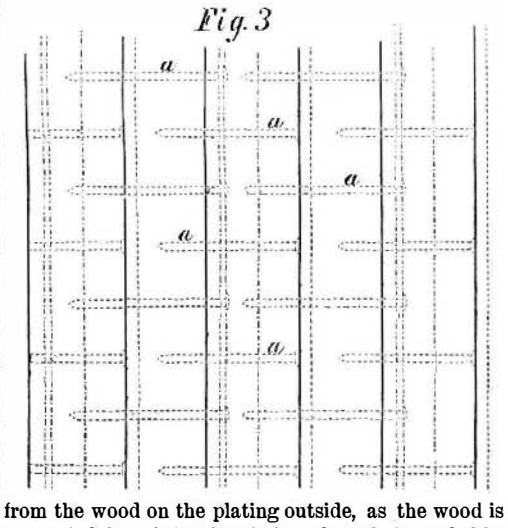


Fig. 2

the plating, and lastly through the calked seams in the plating. The interior of the vessel has, besides this advantage, that of being perfectly smooth, with no obstructions whatever to applying water-tight bulkheads fore and aft, which in ordinary vessels is attended with considerable difficulty. It can be painted and kept clean with the greatest facility, and the cargo is not liable to be damaged by bilge water. There can be no injurious effect from acids distilled

Fig. 3



from the wood on the plating outside, as the wood is separated from it by the pitch and coal-charred felt, and besides this the grooves carry off the water as before mentioned. The bottom can be coppered like that of a wooden vessel, no galvanic current affecting the iron.

The iron shell inside will make the vessel comparatively safe against fire. It will be seen by this that a vessel built on the plan here shown will combine the good qualities of iron vessels with those of wooden ones. The first cost will be greater than that of other vessels, but it will outlast them twice and insure at a low rate, so it will amply repay the excess of the first outlay.

Applied to war vessels this construction is superior to any now used, as the thickness of timber outside can be increased to any dimension and the armor plates bolted on it. The deck will in this case have to be built like the sides of the vessel, the iron frames and plating extending all around, making the hull perfectly water-tight even if loaded down to within an inch of the deck. Even merchant vessels of this description can, at a short notice, be altered into formidable war vessels, and a fleet of ocean-going steamers built as here mentioned would, in case of war, prove to be a valuable defense for the country that owns them. For further information address Louis Hein, care of P. O. Baker, 87 Wall street, New York.

A FEW days ago the steamer *Missionary*, on the Cumberland river, had her flues blown out, and suspicions led to the examination of the wood, which resulted in the discovery of several pieces containing infernal machines.

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