

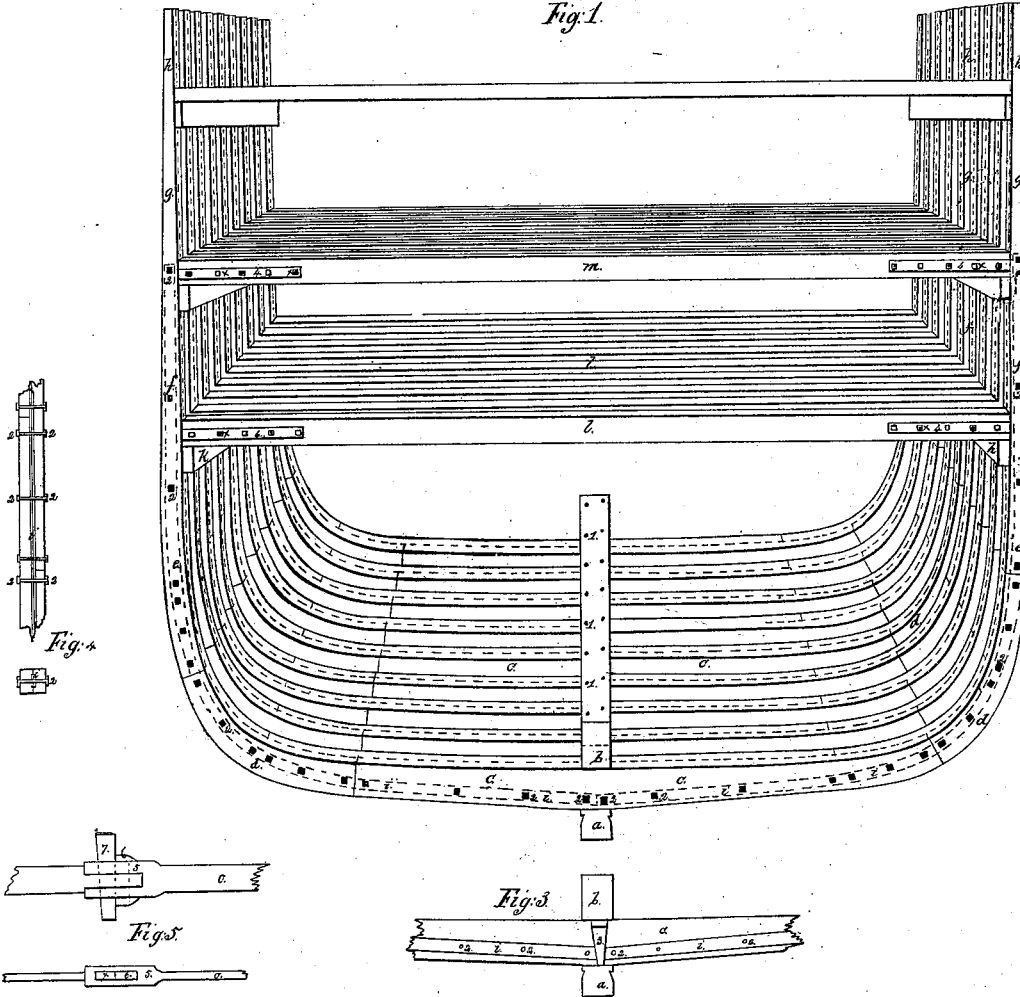
Sheet 1, 2 Sheets.

D. Brown.
Ship Building.

Nº 5,344.

Patented Oct. 30, 1847.

Fig. 1.



Witnesses.
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UNITED STATES PATENT OFFICE.

DAVID BROWN, OF NEW YORK, N. Y.

IMPROVEMENT IN SHIP-BUILDING.

Specification forming part of Letters Patent No. 5,344, dated October 30, 1847.

To all whom it may concern:

Be it known that I, DAVID BROWN, of the city, county and State of New York, ship-builder, have invented and made certain new and useful improvements in the constructive arrangements and mechanical combinations of materials and parts used in building ships and vessels of any size and class and for any purposes, and whether the same are propelled by sails or steam or other power, or by sails and steam or other power combined, by which improvements an increased amount of strength is obtained with a decrease in the weight of the hull of the ship, which improvements consist principally in new arrangements for applying iron conjointly with wood in and on the frame timbers and beams of the ship, and for which improvements I seek Letters Patent of the United States; and I do hereby declare that the said improvements and the mode of constructing and using the same and the effects intended to be produced thereby are fully and substantially set forth and shown in the following description and in the drawings annexed to and making part of this specification, wherein—

Figure 1 is an endwise internal perspective view of the body-timbers of a ship fitted with these improvements, so far as the same can be therein shown. Fig. 2 is a diagonal perspective view of the same and of the parts attached to the beams inside and to the parts on the sides outside the frames which cannot be so collectively shown in Fig. 1.

The detached figures are separately referred to, and the same letters and numbers as marks of reference apply to the like parts in each of the figures.

a is the keel.

b is the keelson, with the bolts 1 1 nearly as usual.

c are the floor-timbers.

d are the first foot-hooks, *e* are the second foot-hooks, *f* are the third foot-hooks, *g* are the top timbers, and *h* are the bulwark timbers, of the several frames, which are cut out and fitted and fayed together in the usual manner, as shown by a dotted line on each internal and upper surface; but before the two several thwartship ranges of timber that constitute each frame are fastened together the sidings or face that meet and close together are to be countersunk or grooved in

each meeting side or face to match the opposite, so that each groove shall receive one-half the thickness of a bar of iron *i* of a proper size, which may be in width between one-fourth and one-third of the depth of the floor-timber at the throat and in thickness about one-sixth of its own width as a general proportion to the size of the floor and other timbers; but these proportions may be arbitrarily varied to suit circumstances. Each bar *i* is to be "swept" or formed nearly to the curve of the timbers, as shown by dotted lines in Fig. 1, and made with holes at proper spacings to match corresponding and equal holes in each piece of timber in each side, and through these holes headed bolts 2 2 2 are to be driven and screwed tight by nuts on their points, so as to press the timber with the inclosed iron bar or auxiliary frame into the closest possible contact.

At the midship part of each floor *c* the butts of the internal and auxiliary iron frames *i* are to be brought together, as shown in the detached Fig. 3, so as to admit a key 3, to be driven in from above when each frame is in place, but before the keelson *b* is put on. The operation of this is the same as that of a key-piece to an arch, and will force the iron frame to sustain the weight and any strain of the timber-frame between the key and the floor-heads, whether the strain be caused by the weight of engines or cargo within the vessel or by the vessel taking the ground, as in nearly all cases of either of these characters large vessels give way first between the keel and floor-heads. By this mode of construction each frame can be set at a distance from the next frame equal to the entire space of one intermediate frame, as shown in Fig. 2, thus effecting a reduction in the weight and cost of material and conversion of frame-timbers of from one-third to one-half the timber, and although the cost and weight of the iron interior auxiliary frame *i* has to be added the collective weight is far short of that of the timber-frame displaced, while the collective strength of the structure will be nearly or fully doubled by the continuity of the iron frame, rendering the whole of each frame of nearly homogeneous strength, instead of the strength being interrupted and reduced, either where the joints and butts of the frame-pieces meet or by any portion of the compass-tim-

ber being grain-cut to give it the needful form in the frame.

In Fig. 1 the iron frame *i* is shown as not continued above the main deck *m*; but this iron frame may be reduced to the proportions of the timber and continued to the upper deck *n* or to the tops of the bulwark-timbers *h*, if thought proper.

When from the great size it may be found difficult to forge and sweep the internal auxiliary iron frames in one length from the keel upward, it will be proper to make them in lengths that can be handled and fit these lengths in with the upper or outer ends of the lower pieces and the lower ends of the next upper pieces lapped or scarfed together; but in any such case the laps or scarfs should be long enough to have not less than four bolts through them and the two next pieces of the wood, and in all such cases the lap or scarf of the iron should be extended from midway between the two next shifts in the length of the wood material, so as to pass beyond each next butt, as shown in the detached duplicate, Fig. 4, which exhibits a vertical elevation and end section of the parts thus fitted and in place. This mode of lapping or scarfing the iron frame in a long scarf may be judiciously applied to commence nearly with the round and rise of the bilge and terminate beyond the next shift of timber above, as by this means the twofold iron will come into and strengthen that part of the frames which is found always the first to suffer and to some extent be forced into a change of form by that peculiar working of this part of the ship which is invariably caused by the action of a heavy rolling sea.

In Fig. 2 the clamp-pieces *k* are shown as underlying the ends of the lower-deck beams *l*, the main-deck beams *m*, and the upper-deck beams *n*, and on the sides of the beams next the ends are iron plates, forming lodging-ties 4, fastened on the beams by bolts and nuts *x*. The outer ends of these ties 4 are reduced to form bolts that go through the frame in the wake of the beam and terminate in a screwed point. At the same level with the ties 4 an iron plate *o* is either laid on or let partly or entirely into the vertical frames to form a longitudinal ribbon-tie the whole length of the vessel in pieces of any convenient length, and where each two lengths meet the ends are formed as a half knuckle-joint, with a long vertical eye through each part, as shown at 5 in Fig. 2 and in the detached Fig. 5 in larger size, with a gib 6 put in, the top shoulder of which rests on the top of the joint, and a key-wedge 7 entered and driven from above each joint placed between two frames, and so far as convenient in the structure no two of these joints placed over each other, although shown so in the drawings.

Between each two ranges of the ribbon-ties *o o* diagonal crossed braces *p p* are to be laid on or let onto the frames, so that they are to be bolted to the frames where these cross each

other, and the ends of each brace *p*, entering between the ribbon-ties and the timber, are to have holes to correspond with those in the ribbon-ties, and through both of these where they meet the screwed points 8 of the lodging-ties 4 are to pass, and a nut on each is to be used to compress all the parts into the closest possible contact, and in the parts where the ribbon *o* and diagonals *p* do not meet the screw-points 8 of the ties 4 are to pass through proper holes in the ribbons *o o* and receive nuts to compress these parts in the same manner.

In the detached triplicate, Fig. 6, a deck-beam *q* is shown in plan and elevation and in an end section as cut asunder vertically through the length and half grooved or countersunk on each inner and meeting face to receive an internal and auxiliary iron-plate beam *r* in the same manner and nearly in the same proportion as to size as the frames are fitted, and the whole secured by screw-pointed bolts 9, passing through the inclosing timber and the iron and compressing the whole together by nuts. One end of the beam *q* is shown with the tie-plates 4 to take the ribbon *o* by prolongations forming two tie-bolts to go through each frame-piece and the ribbon *o*, and the other end of the beam is shown with that end of the internal iron reduced to a single bolt 10, which may either go through or between the two vertical frame-pieces or through one of them. In either case the bolt-point is to protrude through the corresponding ribbon *o* and all be compressed together by a nut, as before described. In this last construction a horizontal lodging-knee of wood may be secured above the clamp-piece *k*, or a diagonal dagger-knee of wood be attached to the face of the clamp-piece *k*. In either case the thwartship arms of these knees may be attached to the sides of the beams by a part of the same bolts that go through the wood and iron collectively, forming the beam itself.

In the drawings only two ranges of ribbon-ties *o o*, with one range of diagonals *p p* between them, are shown; but these parts may be multiplied either above or below the position of the parts shown in the drawings, and in any such case it is desirable, so far as convenient, that each diagonal *p* shall extend from the upper ribbon-tie *o* to the lowest and be attached at the points where each diagonal crosses any intermediate ribbon-tie in the manner already described.

The dividing a beam lengthwise to introduce an auxiliary internal iron plate or beam is not new, taken by itself, and is well understood in common carpentry, and the diagonal braces, taken by themselves, are equally well understood and commonly used for many purposes. Neither are the iron lodging-ties 4 new, these having been used by myself and others several years back; but it is not within my knowledge or belief that either of these parts have ever been used conjointly with iron rib

bon-ties or that this conjoined construction has ever been used either with or without auxiliary and internal iron frames within the wood frames of the ship. This last and the ribbon-ties *o o* I believe to be entirely new for the purposes described; therefore

I claim as new and of my own invention and desire to secure by Letters Patent—

1. The application of an auxiliary and internal iron frame *ii* between the two thwart-ship ranges of material, forming collectively each principal frame-timber of a ship or vessel conjointly with the constructive arrangements for rendering the same effective in place and use, including the fitting and use of the key 3, (shown in Fig. 3,) to act similarly to the key-piece of an arch, and including any variations that may be practical conveniences without effecting mechanical changes, all applied, constructed, arranged, and conjoined substantially as described and shown.

2. The application of the lengthwise iron

ribbon-ties *o*, with their joints 5, the conjoining therewith the diagonal crossed braces *p*, and the constructing and placing these parts so that they shall be united to and compressed into close contact with the principal frame-timbers and the ends of the beams by the bolt-formed ends of the lodging-ties 4 or the bolt-formed ends of the interior plate-beams *r* receiving-nuts by which these portions of the structure are secured together, including any variations that may be practical conveniences without effecting mechanical changes, the whole applied, constructed, arranged, and conjoined substantially as described and shown.

In witness whereof I have hereunto set my hand, in the city of New York, this 24th day of May, 1847.

DAVID BROWN.

Witnesses:

W. SERRELL,

LEMUEL W. SERRELL.