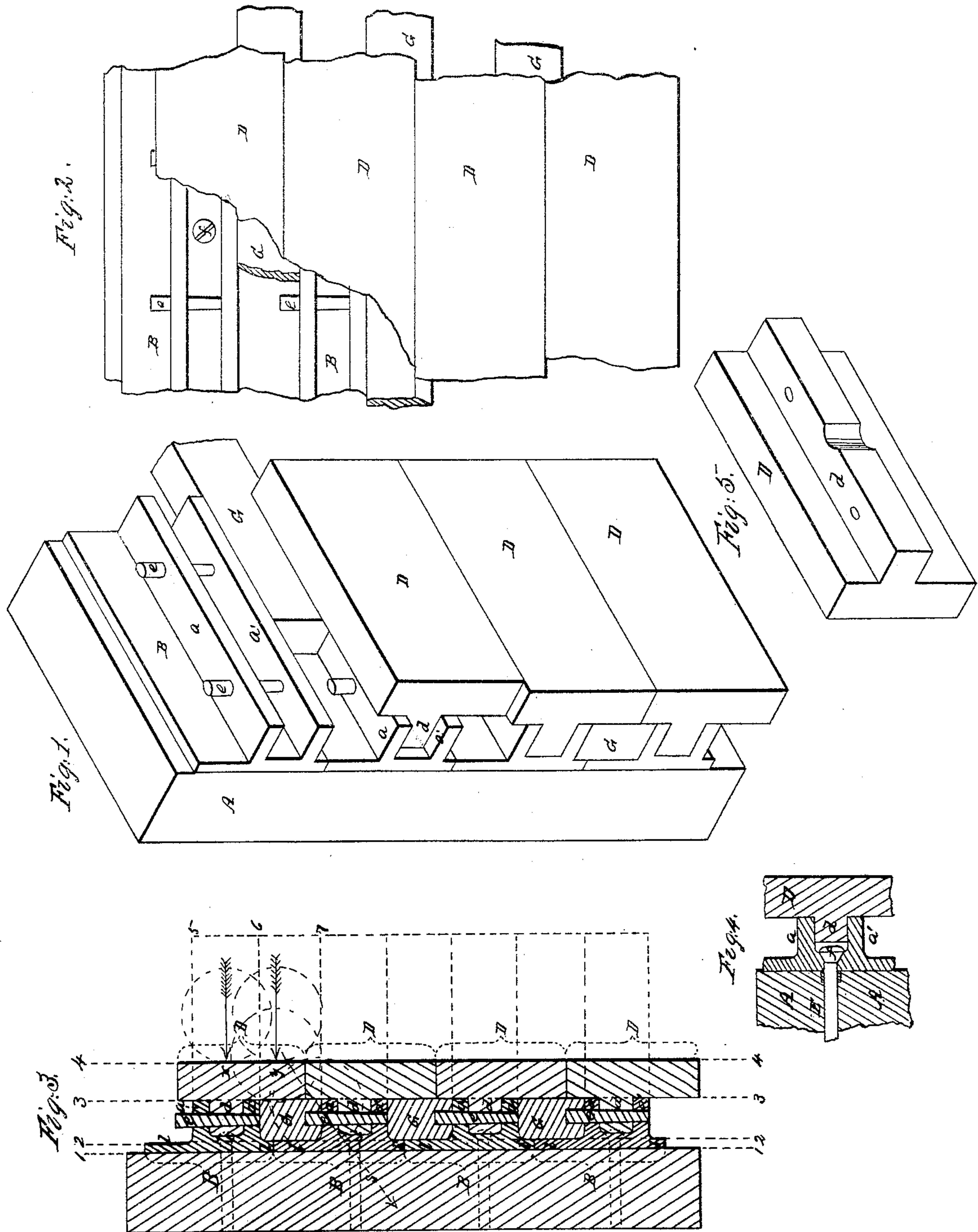


W. W. W. Wood.

Armor Clad.

N^o 36,546.

Patented Sept. 23, 1862.



Witnesses
Charles E. Foster
Charles Howson

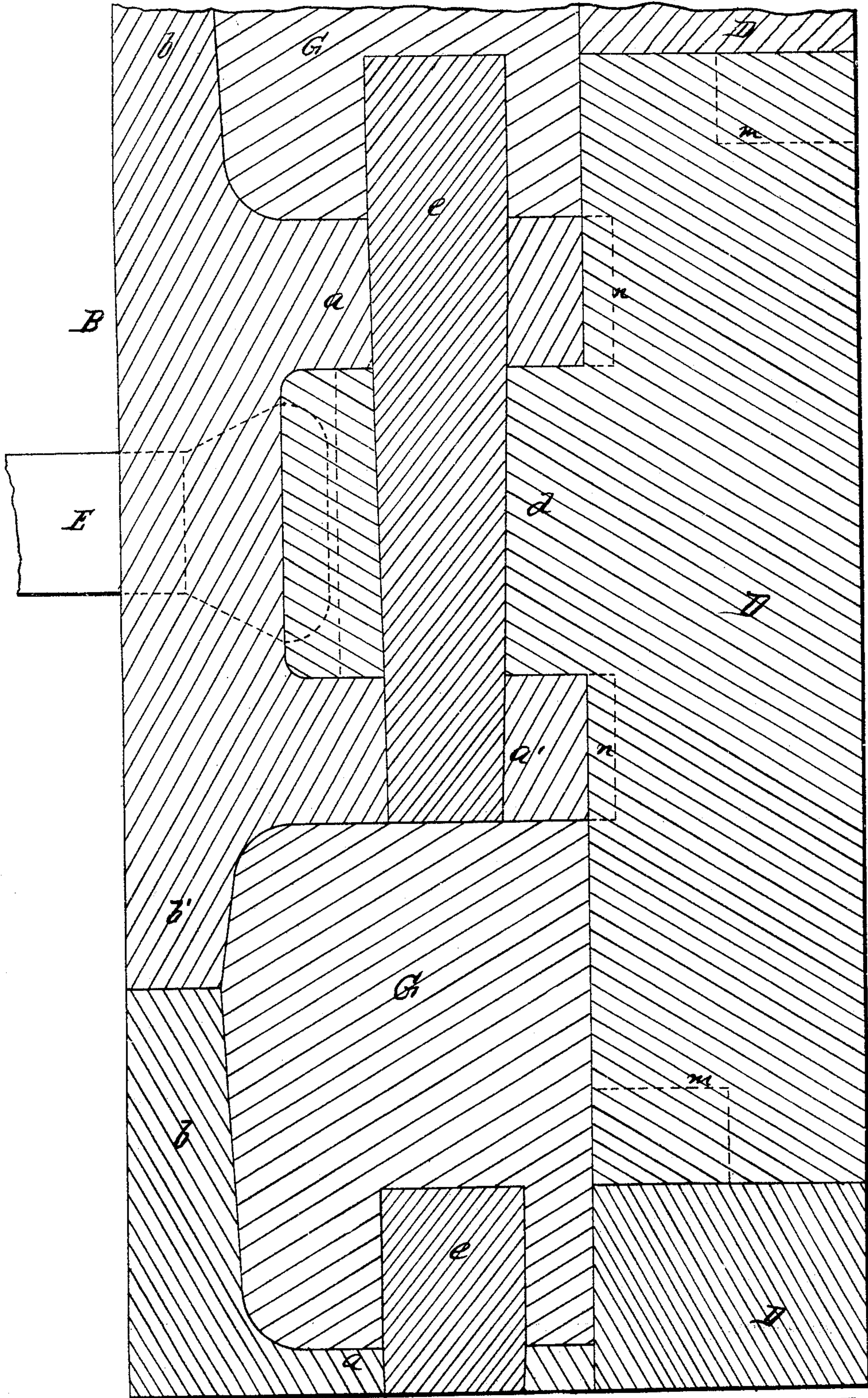
Inventor
Henry Howson
Atty for W. W. W. Wood

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UNITED STATES PATENT OFFICE.

WILLIAM W. W. WOOD, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED DEFENSIVE ARMOR FOR SHIPS AND OTHER BATTERIES.

Specification forming part of Letters Patent No. 36,546, dated September 23, 1862.

To all whom it may concern:

Be it known that I, WILLIAM W. W. WOOD, chief engineer United States Navy, and now residing in Philadelphia, Pennsylvania, have invented an Improved Armor for War-Vessels and Fortifications; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My improved armor consists of a series of inner plates and a series of outer plates, the former being secured to the vessel by bolts whose heads are covered by the outer plates, each plate of one series having a rib fitting between ribs on one of the plates of the other series, the two series of plates being secured to each other by pins passing through the said ribs, the several plates and ribs being so constructed that there shall be at intervals between the two series of plates longitudinal spaces for the reception of strips of wood or other equivalent material, and the whole being arranged, substantially as set forth hereinafter, so as to form a substantial and economical armor the surface of which presents a solid unbroken mass of malleable iron free from the usual bolt or screw holes, and so that a shot which may penetrate the outer series of plates may be deflected, and its force consequently absorbed, before it can take injurious effect on the vessel, as fully explained hereinafter.

In order to enable skilled artisans to make my invention, I will now proceed to explain the manner in which it is carried into effect.

On reference to the accompanying Drawing No. 1, Figure 1 is a perspective view of my improved iron armor for war-vessels, fortifications, &c.; Fig. 2, a face view; Fig. 3, a vertical section; Fig. 4, also a vertical section of a portion of the armor, and Fig. 5 an inside view of one of the ribbed plates. Drawing No. 2 represents a full-sized sectional view of my improved armor.

Similar letters refer to similar parts throughout the several views.

A represents a portion of the wooden hull of the vessel, to which my improved armor is secured, and this armor consists of a series of inner ribbed plates, B, and outer ribbed plates, D. Each inner plate consists of a rolled bar of malleable iron, the form of which, viewed

transversely, will be best observed on reference to Drawing No. 2 and Figs. 3 and 4 of Drawing No. 1, two longitudinal ribs, *a* and *a'*, projecting from and extending throughout the entire length of each bar B. The two outer plates, D, also consist of rolled bars of malleable iron, each bar having a longitudinal rib, *d*, which is arranged to fit snugly between the ribs *a* and *a'* of one of the inner plates, B, the two plates being firmly connected together by a series of slightly-tapering pins, *e*, driven through the ribs *a* and *a'* of the plate B and through the rib *d* of the plate D, so that when thus secured the two plates will bear the position relative to each other represented by Fig. 3, the outer edge of the ribs *a* and *a'* bearing against the inside of the body of the plate D and the outer edge of the rib *d* bearing against the body of the plate B between the two ribs *a* and *a'*.

The inner plates, B, are secured to the hull A of the vessel in the manner shown in Fig. 4, bolts E, situated at a suitable distance apart from each other, passing through the body of each plate at a point between its two ribs *a* and *a'*, as well as through the side of the vessel, the plate being countersunk for the reception of the head *f* of the bolt, and the rib *d* of the plate D being cut away, as seen in Fig. 5, so that under no circumstances can the rib come in contact with the head *f*. Each bolt is furnished on the inside of the vessel with suitable nuts.

If desirable, heavy wood-screws may be substituted for the bolts E, the heads of the screws being slotted or otherwise so constructed that a box-wrench or other suitable instrument may be applied to the heads for turning the screws, and thereby securing the plates to the vessels.

Although the proportions of the inner and outer plates may be varied as the experience and judgment of the constructor may suggest, I consider the proportions illustrated by the full-sized sectional view (Drawing No. 2) as appropriate for heavy armor.

In securing the armor to the sides of the vessel the lowest inner plate, B, is first bolted or screwed to the timbers. Then one of the outer plates, D, is applied to the inner plate, the rib *d* of the former fitting between the ribs *a* and *a'* of the latter, after which the taper-pins *e* are driven tightly through the ribs of both plates. A strip, G, of oak or other tough wood,

is then driven tightly between the portion *b* of the inner plate and the body of the outer plate, the bottom of the strip resting on the top of the rib *a* of the inner plate. A second inner plate is now secured to the sides of the vessel, the portion *b'* of the said plate resting on the portion *b* of the first inner plate, and the rib *a'* of the second inner plate resting on the upper edge of the wooden strip *G*. A second outer plate, *D*, is now added, its rib *d* fitting between the ribs *a* and *a'* of the second inner plate and its lower edge resting on the upper edge of the lower outer plate. A third inner plate and third outer plate, with a second packing of wood, are added, and this is continued until the desired extent of surface is covered with the armor. When viewed vertically, the armor thus constructed may be said to consist of three layers intimately united, the layers being defined by the dotted lines 1, 2, 3, and 4, Fig. 3. The first layer, bounded by the lines 1 2, represents a continuous covering of malleable iron one inch thick in contact with the hull of the vessel, the outer layer, between the lines 3 and 4, representing a continuous covering of malleable iron three inches thick, and the intermediate layer, between the lines 2 and 3, being four inches in thickness and consisting of alternate longitudinal strips of wood and solid ribs of malleable iron for the ribs *a* and *a'* of the inner plates, and the ribs *d* of the outer plates, being intimately connected, may be considered as one solid rib six and one-half inches in depth, the depth of the wood being five and one-half inches. When viewed transversely, therefore, the armor presents between the horizontal dotted lines 5 and 6 a solid mass of malleable iron eight inches in thickness, and between the lines 6 and 7 the armor consists of a mass of malleable iron three inches thick, wood four inches thick, and an iron plate one inch in thickness.

Having now described the manner of constructing my improved armor, I will proceed to explain the advantages which must result from its adoption as a means of protecting war-vessels and fortifications from the effect of projectiles.

One of the main difficulties experienced in the use of iron armor as hitherto applied to vessels has been the necessity of piercing the plates for the reception of bolts or screws. Every bolt-hole presents a nucleus for fracture from the action of projectiles, and detracts seriously from the solidity and power of resistance of the armor. It will be observed that my improved armor is entirely free from this objection, as the outer plates present a solid unutilized mass of malleable iron for resisting the effects of projectiles.

In iron armor as heretofore applied to vessels the heads of the bolts or screws are necessarily exposed to the impact of the projectiles, the certain result of which must be the loosening of the bolts and screws and dislodgment of the plates. In no case can a

projectile have this detrimental effect on the bolts or screws by which the plates of my improved armor are secured to the vessel, as the heads of the bolts are entirely protected from such injurious impact.

As regards economy in construction, my improved armor presents many advantages.

In the first place, both inner and outer bars are ready for application after they have left the rolls and after the pin and bolt holes have been drilled or otherwise formed, the expensive and tedious planing and fitting resorted to in applying the plates of ordinary armor being unnecessary. Moreover, both inner and outer plates are more readily bent to conform to the shape of the vessel than the usual extensive and massive plates.

As regards the weight of material used, my improved armor is light in proportion to its strength and capability of resisting the action of projectiles, as will be readily understood by referring to the view Fig. 3, and considering the effect of an eight-inch shot striking the armor at different points. Should a shot, for instance, taking a course at right angles to the armor, strike the latter at the point *x*, its impact will be resisted by a mass of malleable iron eight inches thick. Should a shot strike the armor at a point between the lines 6 and 7, Fig. 3—say at the point *y*—it must first penetrate through the three inch outer plate, *D*, before it reaches the wooden packing *G*. Its further progress will then be partially arrested by the rib *a'* of the plate *B*, and as the wood presents less resistance than the iron rib the shot must be deflected and its course changed from a direct line to the angular line 8, following which course it is resisted by the lower plate *B* and its ribs, and the force of the shot is consequently absorbed before it can take serious effect on the hull of the vessel.

It is well known that a comparatively small rigid object or any slight inequality in the density or amount of resistance of an object struck by a projectile will cause the latter to deviate from its direct course, and this must be the case when a shot strikes my improved armor at points between the dotted lines 6 and 7, or even at points beyond these lines, inasmuch as the wood packing presents the least resistance and induces the shot to deviate in a direction where it is certain to meet with a greater mass of resisting metal than if it took a direct course. It will be seen, therefore, that causing the shot to deviate after it passes through the outer plating is equivalent to adding an additional thickness to the armor.

In some cases I propose to form a lip on the lower edge of each plate *D*, as shown by dotted lines at *m*, Drawing No. 2, the said lip fitting into a recess formed in the upper edge of the adjacent plate *D*. In some instances, also, I form a longitudinal recess a quarter of an inch, or thereabout, deep on each side of the rib *d* of each outer plate, *D*, these recesses being arranged for the reception of the ribs *a* and *a'* of

each inner plate, B, as best observed on reference to the dotted lines *nn*, Drawing No. 2.

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

The armor composed of the series of inner plates, B, and outer plates, D, the former being secured to the vessel by bolts whose heads are covered by the outer plates, each plate of one series having a rib fitting between ribs on one of the plates of the other series of plates, the two series of plates being secured to each other by pins *e*, passing through the said ribs, the plates and ribs being so constructed that

there shall be at intervals between the inner and outer plates a series of longitudinal spaces for the introduction of strips of wood or other equivalent material, and the whole being arranged substantially as and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. W. W. WOOD.

Witnesses:

HENRY HOWSON,
JOHN WHITE.