G. J. Günther.

Armor Clad.

No. 84,418. Patented Nov. 24, 1868.

Fig: 1.

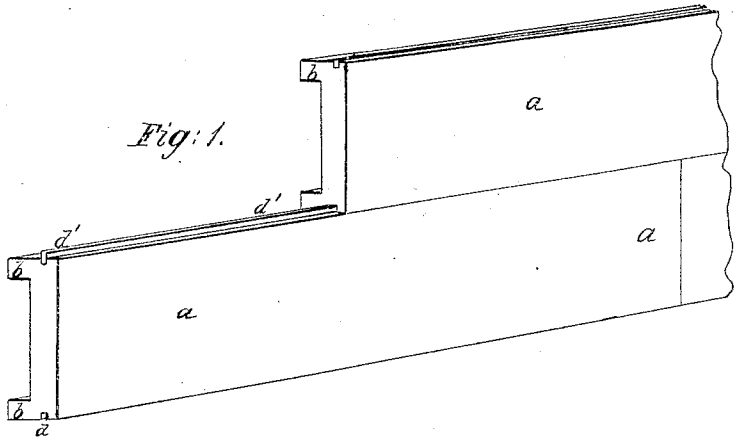


Fig: 7.

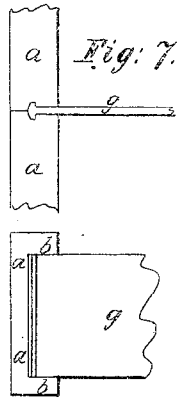


Fig: 3.

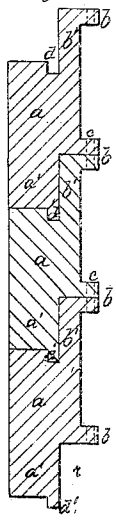


Fig: 4.

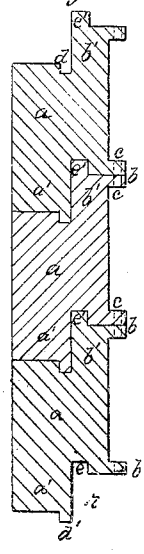
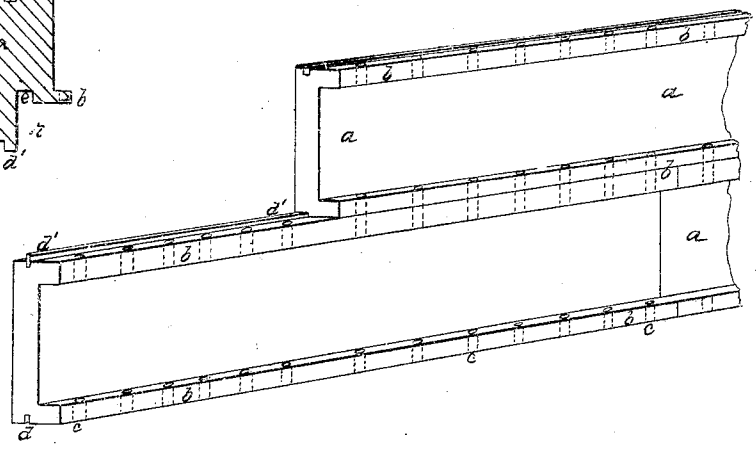


Fig: 2.



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GUSTAV JULIUS GÜNTHER, OF LONDON, ENGLAND.

Letters Patent No. 84,418, *dated November* 24, 1868; *patented in England, October* 25, 1867.

IMPROVEMENT IN ARMOR-PLATING FOR VESSELS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GUSTAV JULIUS GÜNTHER, of London, England, mining-engineer, have invented or discovered certain Improvements in Plating or Protecting Ships of War, Floating Batteries, Turrets, Fortifications, and other like structures, and the manufacture of the plates employed therefor; and I do hereby declare that the following is a full, true, and exact description thereof, reference being had to the drawings hereunto annexed; that is to say—

The objects of my invention are chiefly,

First, that none of those parts of the armor which are exposed to the effects of the enemy's fire shall exhibit any bolt-holes, or other similar sources of weakness.

Second, that, by the shape of the armor-plates, and of other necessary parts hereafter alluded to, and by the mode in which they are put together, the cohesion of all the parts composing the armor may be independent of any backing, or any fastening to any backing, whether the said backing be of iron, wood, masonry, concrete, or any other material; and that thus the improved armor, instead of being, by its weight, a source of weakness and danger to any structure, floating or stationary, which it may enclose or compose, will, on the contrary, contribute, in an eminent degree, towards the solidity, internal cohesion, and stability of any such structure. In fact, in the case of turrets, smaller isolated or detached fortificatory works, armor-plated stationary or movable batteries, exposed watch-towers, or any other structure, where the saving of space is a consideration, the improved armor alone, without any backing, may, provided the plates be sufficiently thick, be made to answer every purpose.

It will be perceived that, in the improved method of armor-plating hereafter described, the tensile strength of the metal composing the armor is made, as far as possible, to contribute towards the solidity and shot-resisting strength of the whole structure. Take, for example, a ship, to which armor-plates, of the shape and in the manner as hitherto and now still in use, have been bolted; the great weight of such armor would obviously, in the case of any accident during action or otherwise, hasten the parting asunder of the component parts of such ship; but if such ship were coated with my armor-plates, the metal of the plates themselves would have to be torn asunder before the ship could be destroyed.

The plates may be oblong, square, polygonal, or any other form, according to the purpose for which they may be intended; but oblong plates being at present most generally in use, that shape has, for the sake of simplicity, been kept in mind in the following descriptions.

Figure I is a front view in perspective, and

Figure II, a back view, also in perspective, of an armor, constructed according to my invention, in its simplest form.

The plates are rolled, forged, or cast, with sufficiently strong back flanges, *b b*, at their upper and lower edges, and only these flanges *b* are perforated with bolt-holes (as indicated by the dotted lines *c c*) in such a manner that, on the lower edge of one plate being placed and fitted upon the upper edge of another plate, bolts may be passed through the flanges *b b* of both or more plates, and the said plates be thus firmly bolted together.

In order to relieve or counteract any sudden strain upon the rows of bolts, by means of which bolts and the flanges *b* the plates are fastened together, grooves of any convenient shape, say of square section, as shown at *d*, fig. 1, are cut into the corresponding opposite edges of the respective plates, in such a manner that, after the junction of the plates has been effected, the two grooves would form a hollow space, also of square section, running alongside of and parallel with the back flanges and their rows of bolt-holes; but before the plates are thus joined together, one or more iron or steel bars, *d'*, are inserted, the body of which fits tightly into and completely fills up the grooves of both the upper and lower plate, so that the bar or bars will first have to be torn or split asunder longitudinally before the bolts could be broken and the plates torn asunder.

Figures III and IV represent sections of plates to be fastened together, by means of back flanges, in the same way as above described, but these plates are rolled, and subsequently planed and grooved in such a shape and such a manner that in each plate the upper back flange *b* is, as it were, attached to an intermediate or "backing" flange, *b'*. I call this a "backing" flange, because said intermediate flange of each subjacent plate serves, as it were, as a backing to the lower or front part *a'* of the superincumbent plate.

The back flanges *b b*, in Figs. III and IV, are of the same shape and serve the same purpose as those in Figs. I and II.

A groove, *d*, is arranged in the upper edge of the part *a* of each plate, at the angle of junction between the upper horizontal surface of said part *a* and the outer or front side of the vertical backing flange *b'*. This groove runs parallel with the said flange throughout the whole length of the plate, while, at the same time, at the lowermost inner angle of the part *a'* of each plate, a tongue, *d'*, is left, the size and shape of which and the groove *d* being such that, on any two thus-shaped plates being joined together, the tongues *d'* of the row of superincumbent plates fit exactly into the grooves *d* of the corresponding subjacent plates.

The plates shown in Fig. IV differ from those in Fig. III only in having additional tongues, *e'*, and corresponding grooves, *e*. The shape of these plates is especially adapted for turrets and fortifications of great thickness, where, on account of limited space, no thick backing could be arranged, or would be convenient.

All the tongues and grooves before mentioned run throughout the whole length of the plates; and all the

sides of said tongues and grooves are parallel with the sides of the respective plates; and the top surface of each tongue, as also the bottom surface of each groove, is at right angles with the aforesaid sides.

It will be understood that, in constructing armor composed of such plates, we have to begin with the lowermost range of plates, the corresponding tongues of each lower plate fitting into the corresponding grooves of each superincumbent plate, the backing flanges *b'* of each lower plate fitting into the recesses *r* of the upper or superincumbent plates.

The upper edges of the topmost plates should be so shaped that the outer edge of the covering or roof of such armor-plated structure could be intimately and firmly joined to the said uppermost front plates by means, say, of tongues and grooves and fastening-flanges. So, also, the lower edges of the lowermost plates would have to be most intimately connected with the foundation or base-structure by being keyed into and firmly bolted to the same.

In any of the above-described methods of armor-plating, it would be more convenient to proceed with the placing of the armor at the same time that the back structure (wherever such is necessary) is being built up or constructed.

The plates shown in Fig. IV may, by leaving out the back flanges *b b*, and by, if necessary, making the backing flanges *b' b'* a little higher, and perforating the same with bolt-holes, be adapted for replacing ordinary armor.

Figure VII shows, in horizontal section, and Figure VIII in vertical section, one of the various methods which may be employed to secure or fasten any of the above-described armor to the back structure, *g* being a plate of T-shape in section, the two tongues, which form the front part of the said plate, fitting into corresponding grooves, which have been cut into the vertical end edges of the two adjoining armor-plates *a a*, while the rear part of the plate or piece *g* is secured in or to the back structure in any convenient way.

For port-holes or embrasures, special strong frames should be forged, if possible, in one piece, the front edge and inner sides of which frames would present to the hostile shot a mass of solid iron, while the non-exposed sides of such frames would contain grooves similar to the grooves *d* of the H-pieces in Fig.ure V, into which grooves the edges of the adjoining armor-plate would fit, and be fastened by means of bolts.

The introduction of specially-constructed port-hole or embrasure-frames, would considerably increase the shot-resisting strength of the whole structure, while, at the same time, such frames would offer greater facilities and safety in any arrangements for closing said openings by means of shot-proof shutter-plates, sliding in strong grooves, and resting and moving, say, on well-oiled steel spheres, instead of rollers.

For turrets and any other round structures, the plates would have to be bent to the proper curve, and the final planing and trimming of their various parts, so as to make them fit exactly to each other, may take place after the bending of the plates.

Plates of very great thickness may be furnished with a greater number of tongues and grooves than those shown in the diagrams.

The number and position of the bolt-holes depend upon the nature of the structure to be plated or protected. If the lowermost range of plates is well secured to a properly-constructed base, and the topmost range be equally well secured to the roof or covering-plates, none of the plates can start from their position even if not secured by means of bolts.

All the joints of any of the above-described system of armor-plating should be filled with a thin layer of strongly-cohesive iron cement, or any other superior cementing-medium, so that, in this manner, the joints and bolt-holes of the whole armor would not only be rendered perfectly water-proof, but also the cohesive strength of the armor be proportionally increased.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of two or more armor-plates with each other by back flanges and bolts, substantially as described.

2. The combination of two or more armor-plates with each other, by means of back flanges and bolts, and tongues and grooves, substantially as described; and this I claim both when the said tongues are attached to and separate from the plates, as described.

3. The method, substantially as described and represented, of fastening armor-plates which are combined with each other by flanges and bolts, to a backing-structure by means of T-shaped plates, substantially as specified.

In witness whereof, I, the said GUSTAV JULIUS GÜNTHER, have hereunto set my hand, this 31st day of March, A. D. 1868.

GUSTAV JULIUS GÜNTHER.

Witnesses:

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