(No Model.)

E. TARDY.

ATTACHING ARMOR PLATES TO VESSELS.

No. 344,218. Patented June 22, 1886.

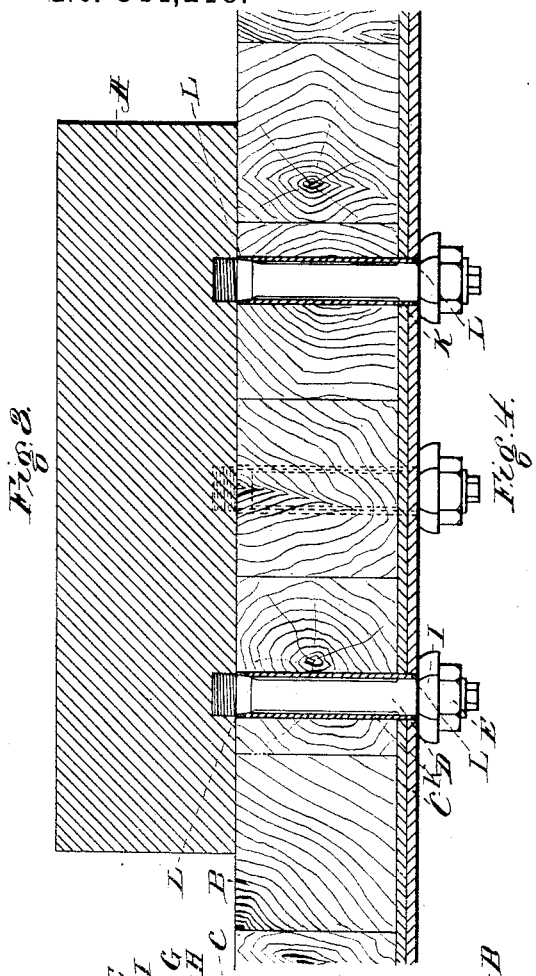

Fig. 3.

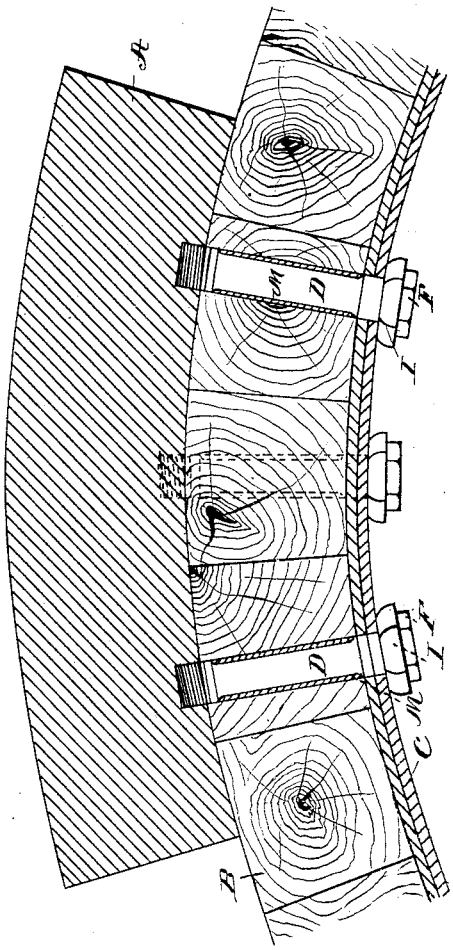

Fig. 4.

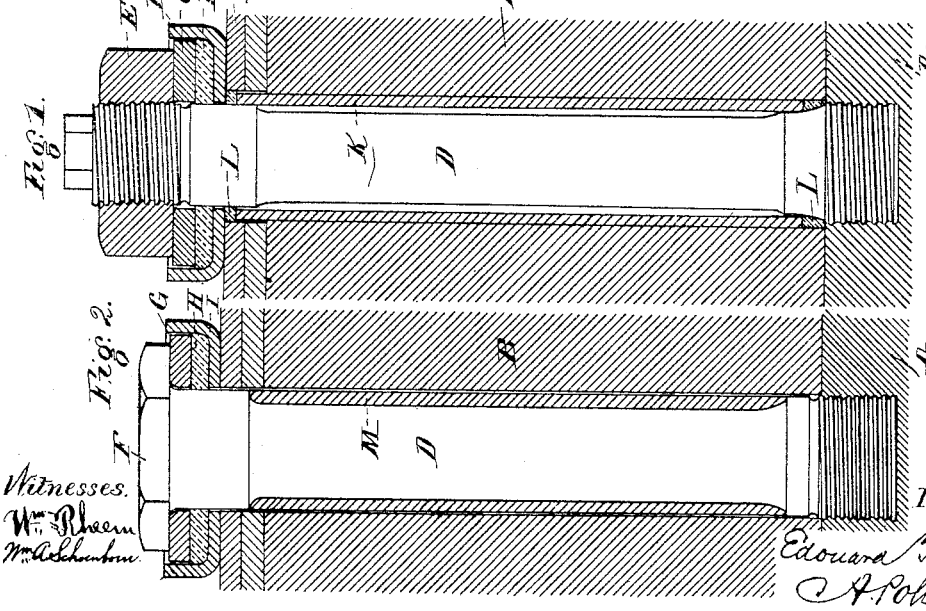

Fig. 1.

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

EDOUARD TARDY, OF DOUVRES, CALVADOS, ASSIGNOR TO SCHNEIDER ET COMPAGNIE, OF LE CREUZOT, SAÔNE-ET-LOIRE, FRANCE.

ATTACHING ARMOR-PLATES TO VESSELS.

SPECIFICATION forming part of Letters Patent No. 344,213, dated June 22, 1886.

Application filed March 4, 1886. Serial No. 194,037. (No model.) Patented in France March 18, 1876, No. 111,977; in Italy September 30, 1876, No. 8,646, and in Austria December 21, 1876, No. 36,686.

To all whom it may concern:

Be it known that I, EDOUARD TARDY, of Douvres, Department of Calvados, in the Republic of France, have invented a new and useful Improvement in Attaching Armor-Plates to Vessels, which improvement is fully set forth in the following specification.

This invention consists in attaching armor-plates to vessels, forts, and other structures by means of bolts tapped into the side next the surface to be protected. With this object a suitable number of holes are formed in the plate, of small depth as compared with the thickness of the plate, and the walls of these holes are threaded to receive the ends of the bolts. In this way the holes for the attaching-bolts do not pass clear through the plate, but only a short distance into the same, and consequently are a source of local weakness much less than where the holes are pierced through the whole thickness of the plate.

It has been known for some years that the fragments of steel armor-plates stop projectiles almost or quite as well as the whole plates. It is important, therefore, to multiply the attaching-points, so that the fragments of a plate when broken may remain in place and efficiently protect the surface covered thereby. For this reason it is desirable to employ the largest possible number of bolts of the new system. A like number of the ordinary bolts passing through the plates could not be used without considerably weakening the plates. This construction relates to armor-plates capable of practical use—*i. e.*, plates made smooth on their inner surface and planed to correspond with the outline of vessels and fortifications.

It has been heretofore proposed to form an armor-plate with ribs or bosses on the inner surface containing threaded sockets for the bolts; but apart from the difficulty of making plates with such projecting parts the scheme is impractical, and has never been adopted for several reasons—principally, because of the difficulty that would be experienced in making such plates conform to and fit accurately upon the sides of a vessel. Moreover, it is desirable that the bolt should penetrate for a certain distance the body of the plate itself.

To accomplish the purposes of this invention by the use of numerous bolts, it would be necessary, with plates such as above indicated, (could they be successfully used at all,) to multiply the ribs or bosses, thereby increasing the difficulties pointed out.

Having prepared the holes in the posterior surface of the plate, as just described, divers arrangements are applicable to the bolts, of which one extremity is screwed into the plate. In general a certain thickness of wood is introduced between the armor and the wall of the ship, turret, or fortification to be protected, so that the elasticity of the wood may lessen the shocks of the projectiles. The bolts pass through the wooden mat and the rigid wall, and are fixed to the latter by a nut or other suitable head. Under this head or nut are placed, first, (that is, next the head or nut,) a metal washer, and then one of rubber. Thus a uniform pressure lengthwise of the bolt is secured, even when it is out of line or bent. Moreover, the interposition of an elastic substance lessens the shocks between the nut or bolt-head and the wall, and protects the end of the bolt. The rubber washer is preferably placed in a metal cup, being confined between it and the metal washer, upon which the nut or the head of the screw-bolt binds.

It is very important that the end of the bolt which is tapped or screwed into the armor-plate should be of greater cross-section than the rest of the shank of the bolt. The reason for this is that at the point of engagement with the plate the bolt is subjected to the greatest strain from the lateral pressure, tending to separate the fragments of the plate, particularly when the projectile strikes at an angle far out of the normal. Beyond this point it is desirable, on the contrary, that the bolt should be reduced, so that it can be bent or stretched throughout the greatest possible length, so as to prevent breaking at the ends. To accomplish this object, it is not desired to taper the bolt toward the middle, so as to render it weakest at the middle point. On the contrary, the shank of the bolt should be of uniform diameter throughout, there being a shoulder or offset near the bolt ends. The bolt has, in fact, three different thicknesses.

The shank is of smallest diameter, the ends are larger, while the threaded part at the end which screws into the armor-plate is of still greater diameter.

The increase in diameter at the end of the bolt which screws into the plate makes necessary a hole in the wall larger than the shank of the bolt. If the wall be submerged, it is desirable to prevent the entrance of water around the bolt. This effect is obtained by means of washers of rubber or gutta-percha clamped by means of a tube surrounding the shank of the bolt. If the wall be not submerged, the tube can be dispensed with, and the space around the bolt can be filled with hemp, wood, or other suitable material. In such walls or such parts of a wall it will be found in general advantageous to make the head integral with the bolt in place of using a nut, in which case the clamping will be produced by the screwing of the bolts into the armor-plate.

The bolts should be of metal—iron or steel—of the best quality, those of extra soft steel being the best.

Having explained the principle of the invention, what is considered the best mode of applying said principle will now be explained with the aid of the accompanying drawings, which form a part of this specification.

Figure 1 is a longitudinal section illustrating in detail one of the bolts, its accessories, and their application; Fig. 2, a similar view of a modification; and Figs. 3 and 4 sectional views showing a flat and a curved plate, respectively, attached to a ship or fortification in accordance with the invention.

In all the figures, A is the armor-plate, having smooth inner and outer surfaces; B, the wall of the ship or fortification; C, a lining to said wall, and D the bolts. The outer ends of the bolts D are threaded, and are tapped or screwed into the back of the armor-plate A for a relatively short distance, so as to weaken the plate as little as possible, while yet giving sufficient hold to retain the plate or pieces of a fractured plate in position. The bolts pass through the wall B, and on the inside are headed, being provided with a nut, E, Figs. 1 and 3, or an ordinary head, F, Figs. 2 and 4. Under the nut E or head F is a metal washer, G, a rubber washer, H, and a metal cup, I. The shank of the bolt uniformly is reduced for nearly its whole length, so that under a sufficient shock or strain it will stretch before the other parts of the bolt will break, while at the threaded part that enters the body of the plate A the bolt is thickened, as shown.

In Figs. 1 and 3 the shank or part in the wall B is surrounded by a sleeve, K, which fits the cylindrical portions at the ends of the shank, and a packing-ring, L, of gutta-percha, is placed in the space at the ends of the sleeve. When the nut E is tightened, the gutta-percha is compressed and fills the space perfectly. In Figs. 2 and 4 the reduced shank of the bolt is surrounded by a packing, M, of hemp or other suitable material.

It is evident that modifications may be made in the details of construction without departing from the spirit of the invention, and that parts of the invention may, if desired, be used without the others.

I claim—

1. The combination of the armor-plate, the wall, an attaching-bolt, a sleeve surrounding the same, and a packing-ring at the end of the sleeve, substantially as described.

2. In combination with a wall and armor-plate, a bolt having the threaded end thickened and the shank reduced, and a sleeve surrounding said bolt, substantially as described.

3. In combination with the armor-plate and the protected walls, the bolts having reduced shanks of uniform diameter and serving to attach the armor-plate to said wall, substantially as described.

4. The combination, with the armor-plate and protected wall, of the bolt having a reduced shank and the sleeve surrounding the same, substantially as described.

5. The combination, with the armor-plate and the wall, of the bolts passing through the wall and tapped into said armor-plate, the sleeves surrounding the bolts, the packing-rings at the ends of said sleeves, and the cups, washers, and nuts at the inner ends of the bolts, substantially as described.

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

E. TARDY.

Witnesses:
BÉGURÉS,
E. LEMARQUIER.