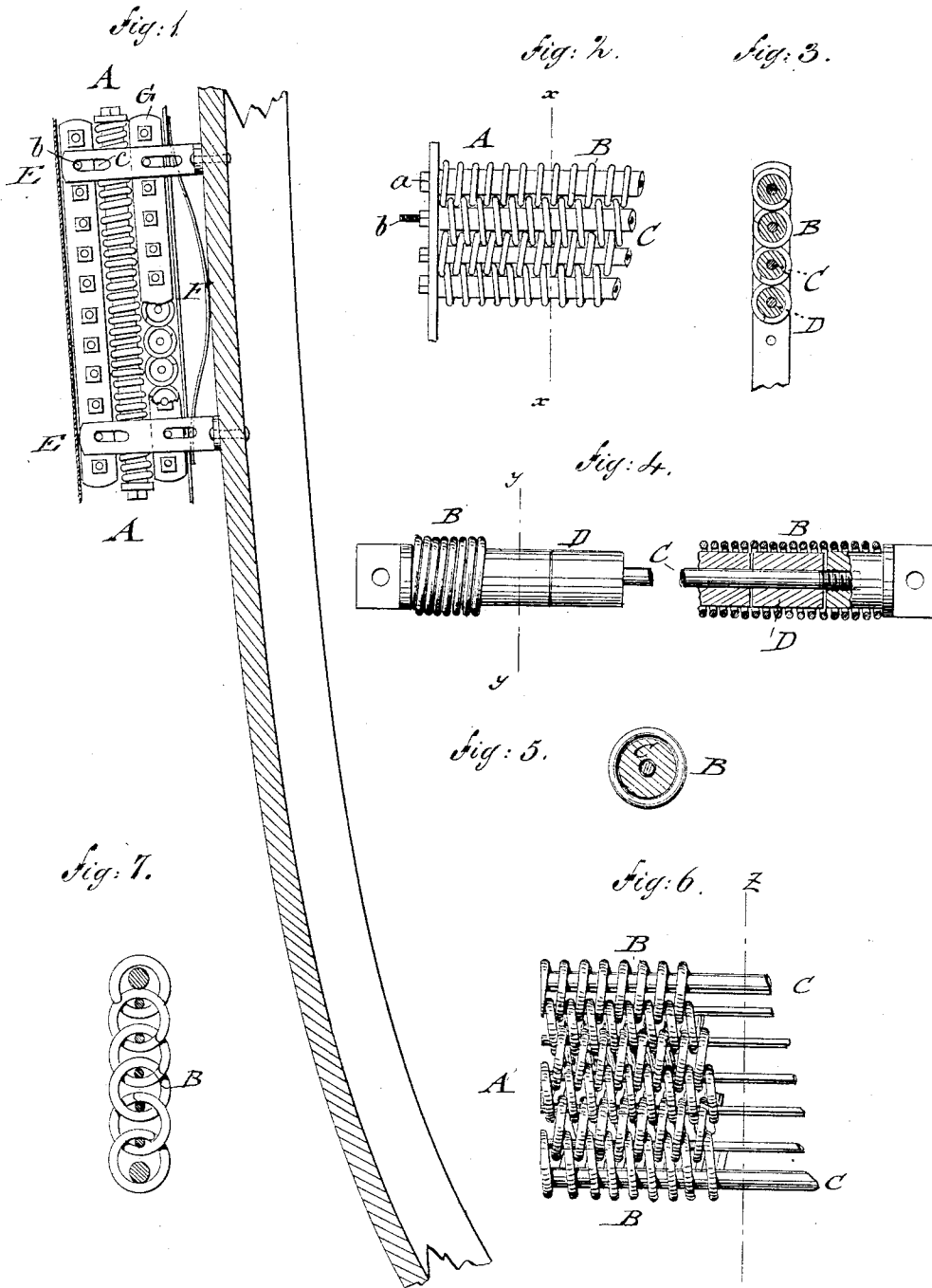


(No Model.)

G. HENZE.
ARMOR FOR VESSELS.

No. 247,251.

Patented Sept. 20, 1881.



WITNESSES:

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ARMOR FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 247,251, dated September 20, 1881.

Application filed December 3, 1880. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE HENZE, of the city, county, and State of New York, have invented certain new and useful Improvements in Armors for Vessels, of which the following is a specification.

This invention has reference to a new and improved system of sheathing or plating vessels of war and other defensive works with a protecting-armor which will resist more successfully the heavy projectiles now in use, while being at the same time of less weight than the present heavy iron plating.

The armors heretofore in use were composed of steel and iron plates of sufficient thickness to resist the force of the projectiles, which armors had the disadvantage of rendering the vessels unwieldy and bulky without imparting a sufficient protection to the same, owing to the brittleness of the metal plates employed, which were liable to be injured by the projectiles, so that the vessels were in danger of being sunk.

My invention is based on the principle of making the armor of materials which yield to some extent to the action of the projectiles, in place of heavy rigid plates. The projectiles may batter a yielding or elastic armor, but they will not penetrate through the same, so as to expose the vessel to the danger of sinking.

My invention consists of a series of panels made of superposed layers of steel springs, which are strengthened by center bolts passing through the same, and by a filling of cork, rubber, or an alloy of metals of a sufficient degree of softness. The springs are locked together or interwoven with each other, the layers of springs being so arranged one above the other that their bolts cross each other at right angles, and that the different layers break joint. The interstices between the layers of springs are also filled with some ductile metal, so that the whole presents a homogeneous continuous armor for vessels.

In the accompanying drawings, Figure 1 represents a vertical transverse section of a vessel with my improved armor. Figs. 2 and 3 are, respectively, a side view and a vertical transverse section on line *x x*, Fig. 2, of a portion of a panel of the armor. Figs. 4 and 5

are a detail side view, partly in section, and a vertical transverse section on line *y y*, Fig. 4, of a spring; and Figs. 6 and 7 show a modified construction of a panel.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a panel of my improved armor for sheathing or plating vessels or other defenses of war, which panel is composed of a series of layers of spiral steel springs, B. The springs B are either arranged closely sidewise of each other or so that the convolutions of one spring intermesh with those of the adjoining springs, as shown respectively in Figs. 2 and 6. The springs B are strengthened by means of wrought-iron center rods, C, the ends of which project through plate-bars G, to which the rods are held by means of screw-nuts *a*. These bars are provided near each end with lugs *s*, formed by the extension of the rods C, which lugs slide in slots *c* of the brackets E, and enable each panel to yield bodily to the force brought against it. The space between the center rods C and the springs is filled up by cork, rubber, or a composition of the same, or by an alloy of suitable soft metals, or by any other suitable material having a certain degree of elasticity. The panels are made of suitable size, the armor being composed of a certain number of such panels, which are secured by brackets or stays E to the hull of the vessel. Between the panels A and the hull may be furthermore interposed strong buffer-springs F, as shown in Fig. 1. The layers of each panel are superposed in such a manner that their bolts cross each other at right angles. Several panels may be superposed one above the other, so as to break joint. The layers of two adjoining panels are properly fastened together by interweaving the end springs and locking them together by bolts. The panels are preferably protected at the outside by suitable metallic sheeting against direct contact with the water. The small interstices between the several layers of the panels are also filled up with a suitable elastic composition, or with copper or lead, or any other ductile metal, which, in connection with the springs, resists the force of the projectiles by yielding to the same. Though a

change may take place in the exterior shape of the sheathing, the passage of the projectiles through the armor is prevented.

5 By the alternating arrangements of the panels and the interweaving of the springs the armor presents a continuous and homogeneous sheathing for vessels, which offers greater resistance with less bulk and weight than the steel or iron plates at present in use.

10 The same construction may also be applied for the protection of land-batteries and other defences required in warfare.

The principle which forms the fundamental feature of my armor is to substitute as much
15 as possible for the solid metal plates, which are liable to destruction by their crystalline texture, a series of intimately interlocking and interwoven panels of yielding material, the fibrous texture of which possesses greater cohesion
20 against the shocks of heavy projectiles. Though the armor may be battered, it will not be penetrated by the projectiles, so that vessels and other defenses of war are thereby fully protected against damages and destruction.

25 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An armor for vessels and other defenses consisting of a series of panels composed of
30 superposed layers of spiral springs, having strengthening center rods and a filling of yielding material, said springs being united by suitable ties or retaining devices, substantially as described.

35 2. An armor for vessels and other defenses

consisting of a series of panels made of superposed layers of intertwined spiral springs having strengthening stay-rods and a filling of yielding material, the interstices between the layers and panels being also filled up with yielding material, substantially as and for the purpose specified. 40

3. In an armor or sheathing for vessels, a panel composed of superposed layers of spiral springs strengthened by center rods and a filling of yielding material, the springs of one layer being alternately placed at right angles to those of the other layers, as set forth. 45

4. In an armor or sheathing for vessels, a series of panels composed of superposed layers of steel springs strengthened by center bolts and suitable yielding filling, in combination with supporting-brackets and cushioning-springs interposed between the panels and the hull, substantially as described. 50

5. In an armor for vessels, the combination of a series of springs, B, arranged in a layer or layers, and provided with strengthening center rods, C, having nuts *a*, the yielding filling D, the bars G, and the slotted arms E, substantially as described. 55

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 8th day of November, 1880.

GUSTAVE HENZE.

Witnesses:

PAUL GOEPEL,
CARL KARP.