A. C. Twining. Sheet 1, 2 Sheets.

Armor Clad.

No. 39,363. Patented Jul. 28, 1863.

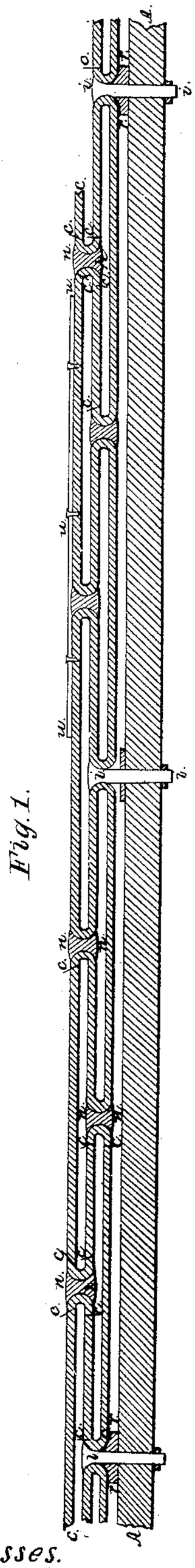

Fig. 1.

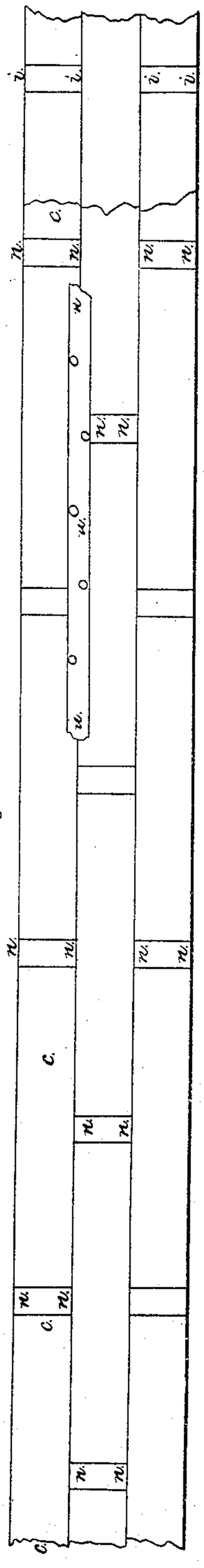

Fig. 2.

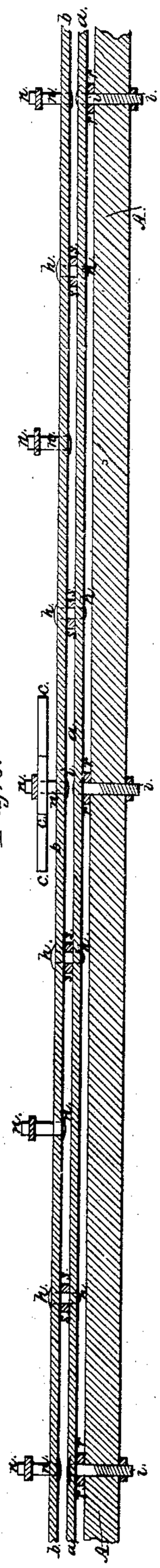

Fig. 3.

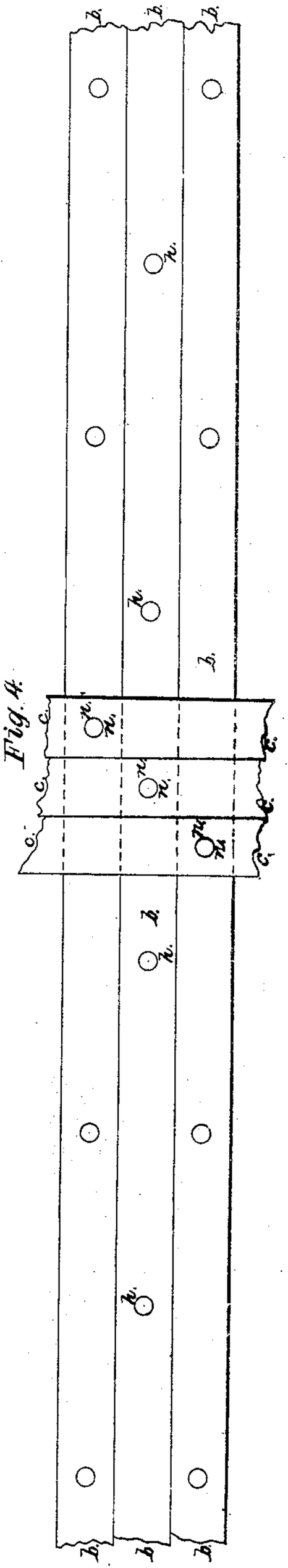

Fig. 4.

Witnesses.

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T. W. Twining.

Inventor.

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A. C. Twining. Sheet 2, 2 Sheets.

Armor Clad.

No. 39,363. Patented Jul. 28, 1863.

Fig. 7.

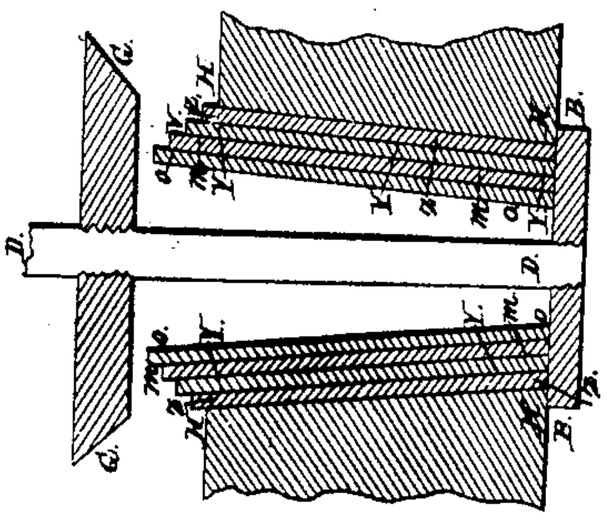


Fig. 8.

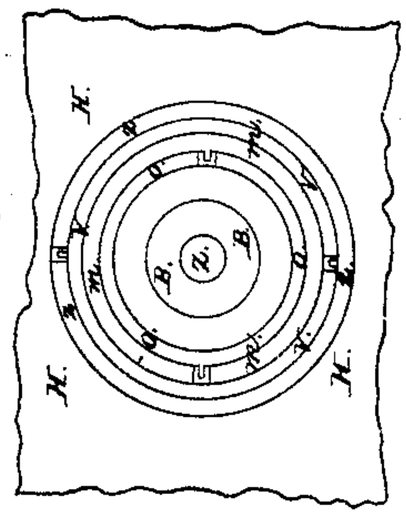


Fig. 5.

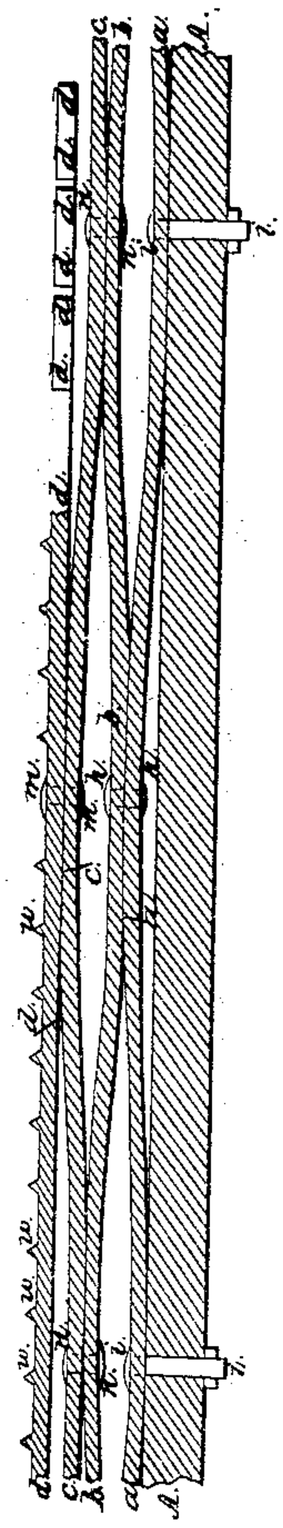
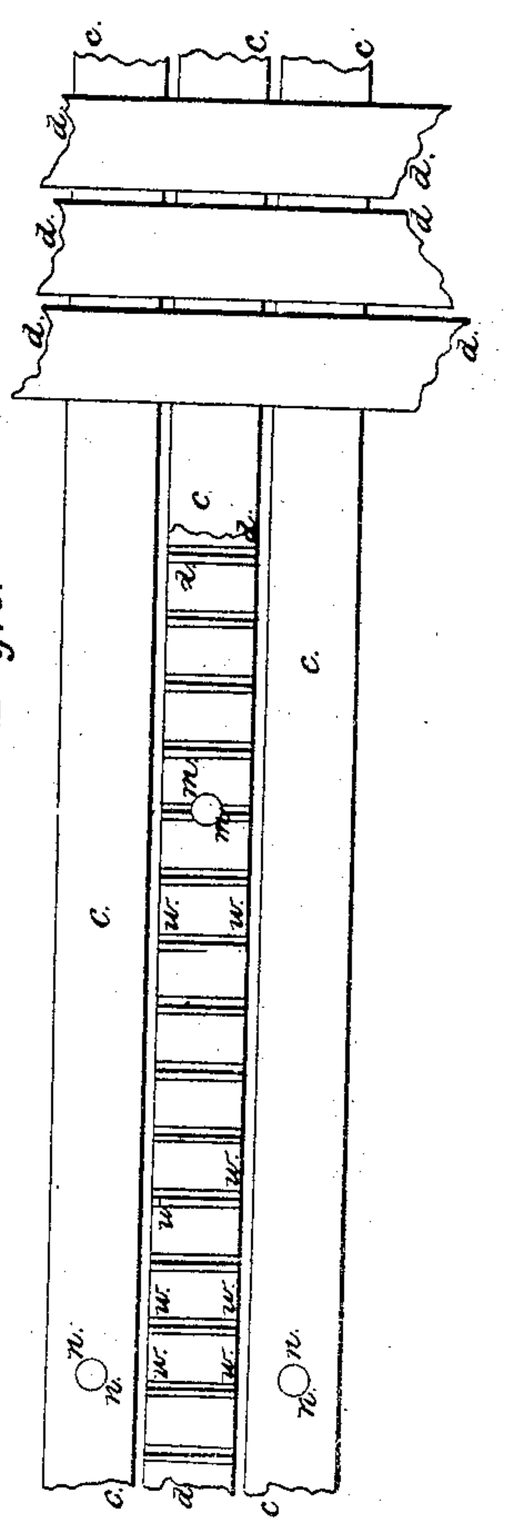


Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

ALEXANDER C. TWINING, OF NEW HAVEN, CONNECTICUT.

IMPROVED MEANS OF CHECKING AND RESISTING MISSILES.

Specification forming part of Letters Patent No. **39,363,** dated July 28, 1863; antedated April 11, 1863.

To all whom it may concern:

Be it known that I, ALEXANDER C. TWINING, of the city of New Haven, county of New Haven, and State of Connecticut, have invented a new and useful Improvement in the Art and Means of Resisting the Impact of Moving Bodies and Missiles; and I declare that the following is a true and full account and description of my said invention.

The improvement consists, primarily, in checking the velocity of the moving body or missile, not by receiving its impact in the usual way all at once upon a fixed or massive object, but by dividing that impact into several distinct and partial impacts, received upon a succession of masses or plates free (except the terminal one) to yield to the impact and receive motion, by which means the moving body is brought to rest by degrees and successive stages, there being also auxiliary agencies, as friction, elasticity, or that of cutting-edges. Let it be observed, however, that the motion is not to be checked principally by elasticity of the plates, as in the case of springs. On the contrary, it is to be checked mainly by the opposite property of inertia, as if different parallel plates, no matter how inelastic, were suspended in front of one another with spaces between, thus, a——a / b——b / c——c, and the plate whose section is *a a* were first struck and takes away motion. Then both that plate and the missile move onto *b b*, which last takes away still more motion. Then the three move onto *c c*, which again takes away motion, and may itself be brought up with a broad surface against the timber or other face to be protected.

I briefly describe the invention as follows: I first cover the ship's side or other surface with plates of metal or other suitable material not lying in contact with that surface, but kept a little apart by lugs, either separate or formed upon the plates, and I bolt, rivet, or clamp through the plates, lugs, and side. This first layer of plates or bars I cover with a second, having in like manner lugs to keep the plates apart, but placing those lugs at alternate distances about half-way between the first named, and bolting the layers of plates together through them. In like manner I may cover the second layer with a third, and this with a fourth, if necessary, and so on. The plates or bars of the different layers need not be parallel lengthwise, but may cross at right angles, or like a lattice, or may lie superimposed, like scales. The outer layer may with advantage be of hardened steel. Instead of lugs formed on or put between the plates, as above, I may curve the plates or bars in a waving manner, to touch the ship's side; or the successive layers in parts, alternating with one another, like the lugs, and bolted at the points of contact instead of through the lugs; or a single plate may be made to form different layers by bending forward and back, so that the bends shall form lugs, and these may have a joining-piece across hollowed out to fit and unite the joints, and still allow a yielding. In short, I construct a protection of alternate layers of plates or bars, with spaces formed vacant between, so that when a shot strikes it may bring down the yielding layers successively upon one another, and be checked gradually by successive impacts, and, in some minor degree, as far as can be, by the elasticity of the plates.

In the accompanying drawings, Figures I, III, and V represent the plates or bars in section, and Figs. II, IV, and VI the same in plan, giving a surface view. Fig. VII shows in section, and Fig. VIII in plan, a modified arrangement for lighter purposes.

In Figs. III and IV, let A A be a section, say, of a ship's side, and *a a a* the section of an iron or steel plate (or, rather, of a layer of such plates placed side by side, as in the plan) fastened to A A by the bolts *i i i i*, allowing a little lateral slip, and the lugs or bars *r r r r*, &c., being interposed; also, *b b b* and *c c c* are sections of a second and third plate or layer fastened each to its preceding layer at the parts *h h h h*, &c., *n n n n*, &c., respectively, but separated therefrom by knobs or lugs at the bolts or fastenings, as *r r s s*, for example. The joints of contiguous plates may be covered, as at *u u u*, or set apart, as in Fig. VI. It is an object to allow motion toward or from A A as free as practicable.

In Figs. I and II a single plate, *c c c c*, bends back and forward, to form the successive layers, and may have connecting-pieces *n n n n*, &c., slipped in laterally at the bends.

In Figs. V and VI the same layers and fastenings will be recognized by the same letters.

The sharp steel ridges or edges on the outer plate may cut and split the shot in some cases. It should be observed that *c c c c*, instead of having its successive bends in a progress along and parallel to the protected surface, may bend alternately to right and left in a progress outward from that surface, and of the extreme segments, into which the bends divide the plate, one will be bolted flat upon the protected surface and the other will stand parallel to it on the outside.

In Figs. VII and VIII the parallel plates *o o o o m m m m v v v v*, &c., are cylindrical or conical and contiguous to or pressing together by elasticity at their surfaces, but the spaces or intervals equivalent to those above described are between their extremities instead of their broad surfaces, and these extremities receive successively the impacts by the moving mass G G, which is guided by the stem D D. If G G is moved back or returns, the attached plate B B will bring back the successive cylindric or conical plates to their first position for a repetition of the operation. The friction of the plates on one another, as well as the inertia, will resist G G.

Suppose, now, each plate or layer to check one third or one-fourth of the velocity, and to go on with the moving mass to the next, this to the next, and so on. Vastly more time is allowed in each and every successive instance than a single fixed plate could afford or allow. Since, therefore, penetration or fracturing of armor-plates depends upon suddenness of the check received, or of the impulse imparted by the missile, and decreases prodigiously with the relative or real velocity, the several layers together will have a much less aggregate necessary thickness than a single fixed plate which would be competent to the same resistance, producing great economy of material, and, in the case of marine batteries, lightening greatly the draft.

What I claim, and desire to secure by Letters Patent, is the following:

1. The above construction or arrangement, by successive plates or layers, with the successive separating spaces or intervals between, and with lugs or angle-irons or projections, when necessary, or any construction substantially the same, all for the purpose above described.

2. The mode of constructing the successive plates or layers and spaces between by bending forward and back a single plate (or plates placed side by side in layers) from outside to inside, or vice versa, substantially as and for the purpose specified.

ALEX. C. TWINING.

Witnesses:

S. DOUGLAS TWINING,

T. W. TWINING.