4 Sheets—Sheet 1.

B. KENNON.

Counterpoise Batteries.

No. 204,831. Patented June 11, 1878.

Fig. 1.

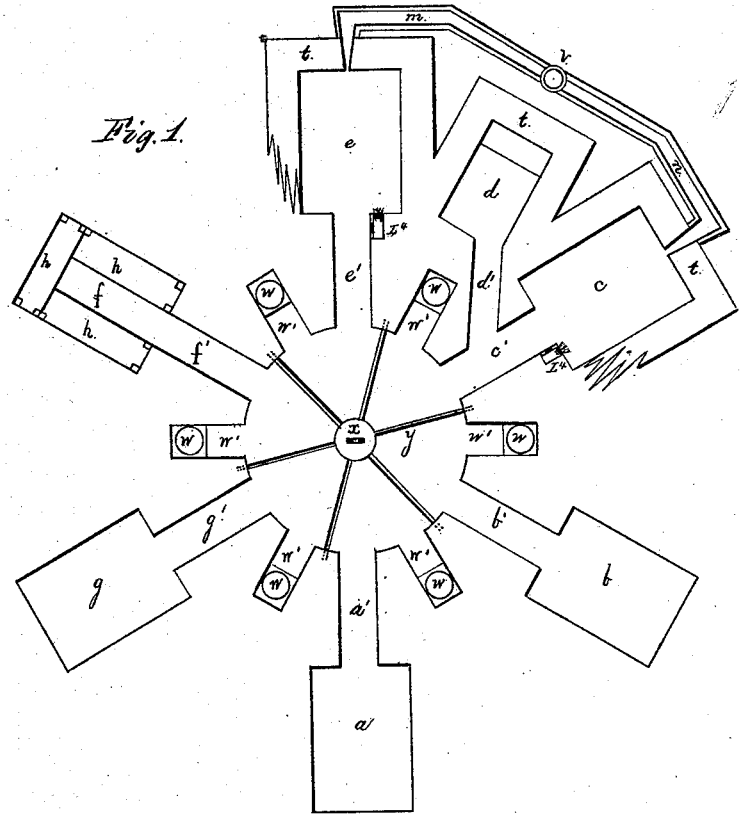


Fig 2.

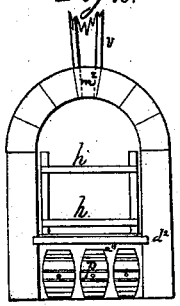
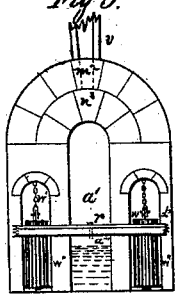


Fig 3.



Witnesses.
A. A. Seaman
M. Gardner.

Inventor.
Beverley Kennon.

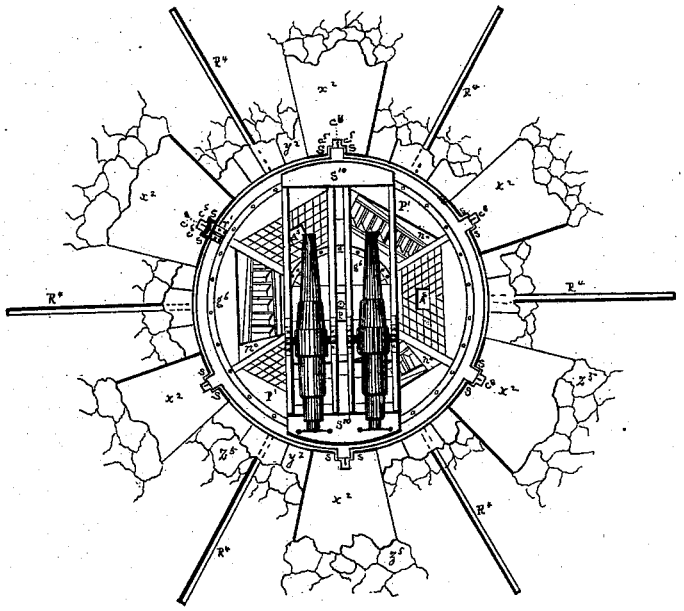
4 Sheets—Sheet 2.

B. KENNON.

Counterpoise Batteries.

No. 204,831. Patented June 11, 1878.

Fig 4.



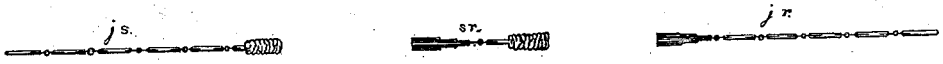


Fig 5.

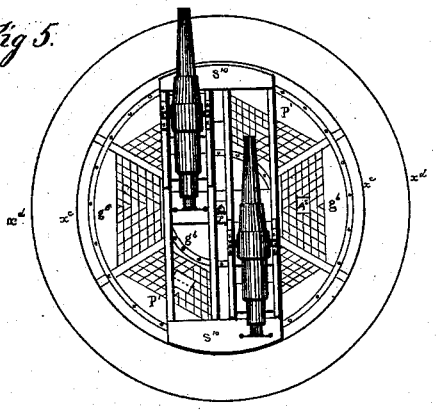
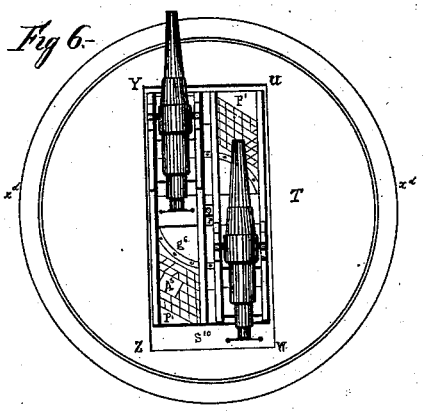


Fig 6.



Witnesses:
A. A. Lenthan
M. Gardner

Inventor:
Beverley Kennon.

4 Sheets—Sheet 3.

B. KENNON.

Counterpoise Batteries.

No. 204,831. **Patented June 11, 1878.**

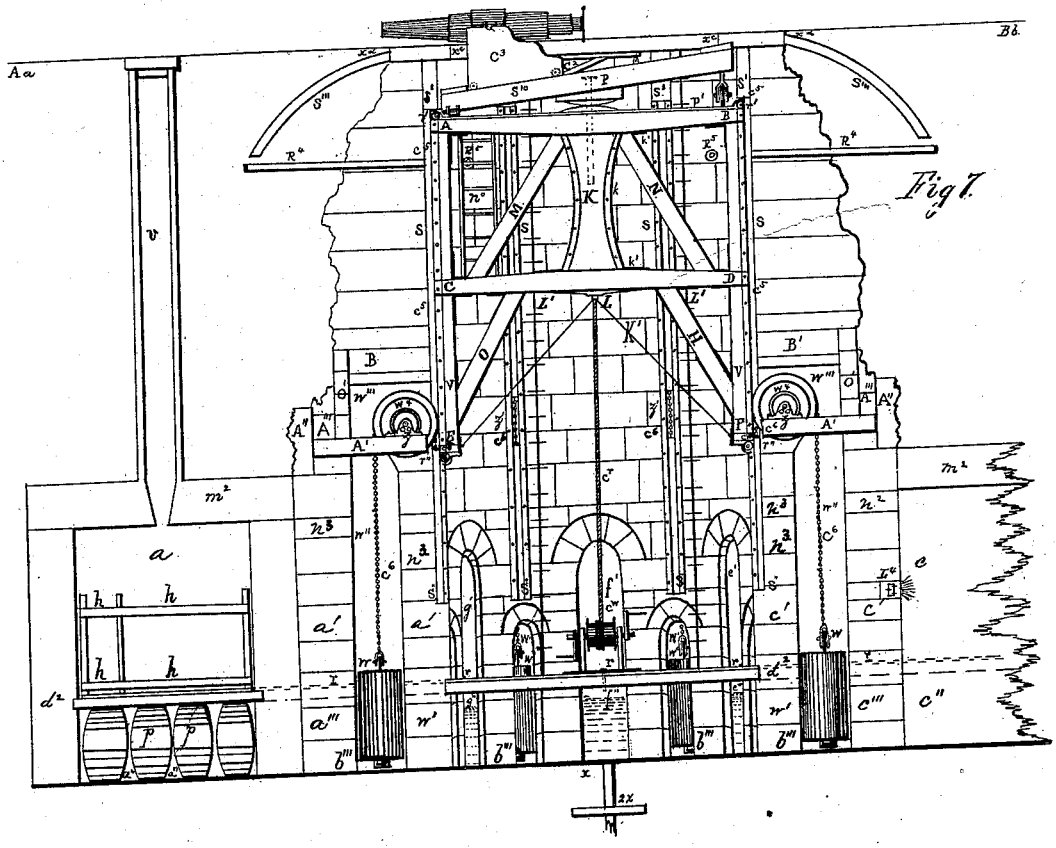


Fig 1.

Witnesses:
A. Pantzer
M. Gardner

Inventor:
Beverly Kennon.

4 Sheets—Sheet 4.

B. KENNON.

Counterpoise Batteries.

No. 204,831. **Patented June 11, 1878.**

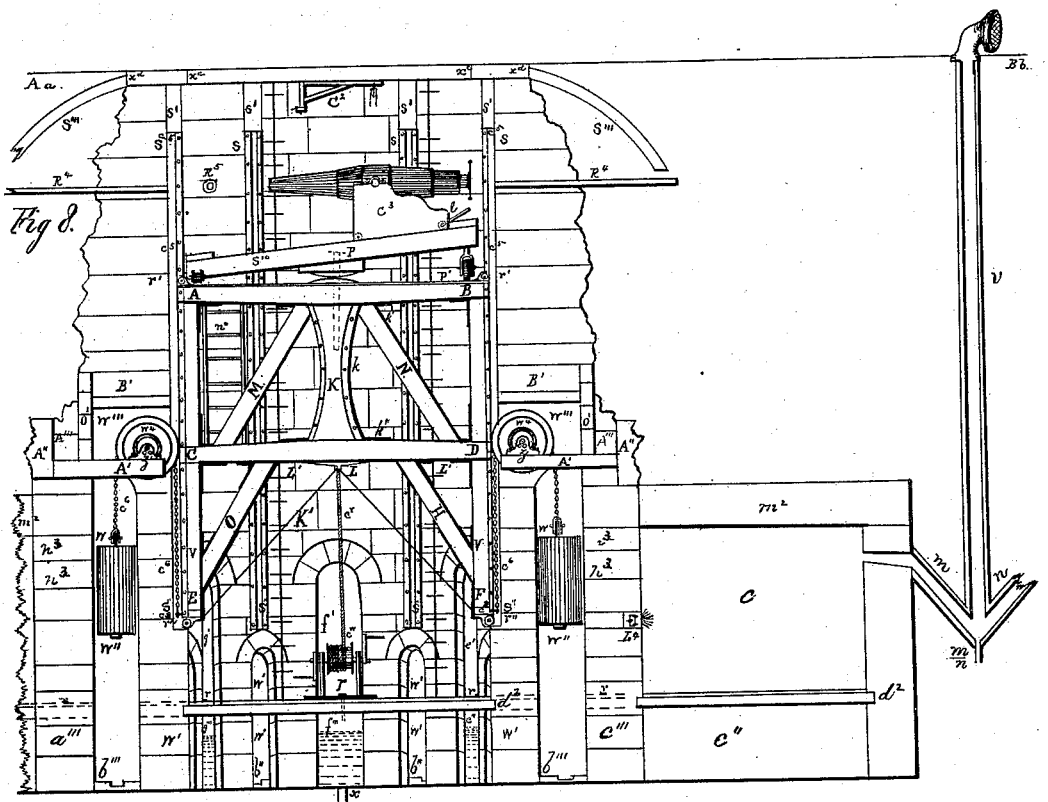


Fig 8.

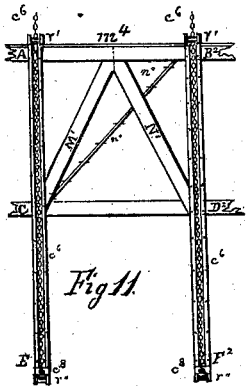


Fig 11.

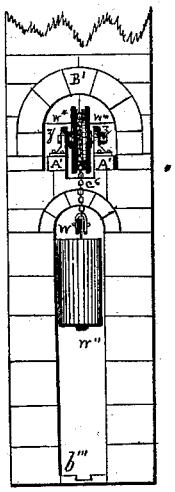


Fig 9.

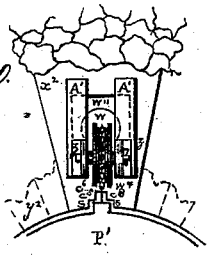


Fig 10.

Witnesses:
A. Spellman
H. Gardner.

Inventor:
Beverley Kennon

UNITED STATES PATENT OFFICE.

BEVERLEY KENNON, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN COUNTERPOISE-BATTERIES.

Specification forming part of Letters Patent No. **204,831**, dated June 11, 1878; application filed December 27, 1875.

To all whom it may concern:

Be it known that I, BEVERLEY KENNON, of Washington city, in the District of Columbia, have invented a Counterpoise-Battery for the protection of cannon in coast defense and the field, and also on board iron-clad gun-boats for river and harbor defense; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

Figure 1, Sheet 1, is the plan of the foundation for the battery, which we will suppose in this instance to be thirty-three feet deep and sixty-three feet in diameter. In its center an open space of thirteen feet in diameter will be left, extending to the surface. All other portions of the original space of thirty-three by sixty-three feet will be covered with earth or sand after the work in it is made ready for this covering. This open space or tube will form, if I may so express it, an "inverted Martello tower," within which a platform (counterpoised) will operate, and upon which two pieces of cannon will be mounted. On the circumference of this inner circle or tube, which will form the gun-pit, there are twelve openings or passage-ways leading into rooms or the wells for the counterpoises.

a is the kitchen, with a cellar, *a''*, underneath, Fig. 2, for the stowage of fuel; *a'*, its passage-way.

b is the sleeping-room for the officers. *b''* (other figures) is the cellar underneath, in which will be stored liquors, medicines, and those things which require special looking after; *b'*, its passage.

c is the shell-room; *c''*, its cellar, to be used for the stowage of extra projectiles or provisions; *c'*, its passage; *d*, water-closet; *d'*, its passage, leading from that of the shell-room. There is no cellar under this room; but there is one under its passage-way, which, like the others, is used for a water-tank.

e is the magazine; *e''*, its cellar, for the stowage of ammunition. Nothing else will be allowed to be placed in it. *e'*, its passage; *f* and *g*, soldiers' quarters; *f''* and *g''*, their cellars, to be used for the stowage of provisions; *f'* and *g'*, their passages. In *f* is given the arrangement for the berths *h* for the men, which are in two tiers, Fig. 2.

Under *a' b' c' d' e' f' g'* are spaces or cellars which are to be converted into reservoirs for water, where it will be kept cool and sweet. Iron tanks will be a useless expense, and water should never be kept in wooden vessels.

L^4, light-rooms for magazine and shell-room; *w*, the counterpoise-weights. The space or wells in which they work are entered by the passage *w'*, which, in other figures, is shown comprehensively.

v, the ventilator-pipe for the magazine and shell-room, which, coming from the surface to a point behind these rooms and below the openings into them, has two branches, *m* and *n*, inclining upward, Fig. 8, and entering these rooms through their rear walls. The greatest security against the possibility of their being made channels for communicating water or inflammable matter is thus provided, and in the bottom end of the main stem *m n*, Fig. 8, an opening permits any rain-water which may be in it to pass out of it into the sand in which it is built. Wire-gauze must be placed over the opening where these pipes or branches enter the magazine and shell-room, to prevent the passage of flame. These pipes may be made of wood, stone, brick, or the present style of water-pipe.

The ventilator-pipes enter all other rooms, Figs. 2, 3, and 7, directly through their roofs. By this means much light and air is admitted. Indeed, the ventilation is perfect, as is illustrated in the cases of wind-sails on shipboard.

The ventilator-trimmers, which ship in place on the surface end of the ventilator, should have glass sides, back, and top, so as not to obstruct the free passage of light, as well as air. At any time during the day there is light enough below throughout the battery to read or write.

At the point *x* a post (shelved and loaded, so as not to be easily drawn from its place) is planted, to which the apparatus for lowering the platform must be attached; or the cross-pieces *y* of timber, with the walls of the battery resting on their ends to keep them in place, may, at their point of intersection, have this lowering apparatus attached to them; and in cases where there are no cellars to this battery, they will serve as deck-beams, upon which a flooring will be laid. In this case we have a cellar throughout the battery, which is seen

under d^2, Fig. 2, &c., and which beams d^2 are floored over.

p in Fig. 2 indicates provision-barrels in the cellar a'', and in Fig. 3, in the passage-way a', a water-tap, r, is seen, in which a hand-pump is operated to draw off the daily supply, when it will be locked; a''', the water-tank, filled at r.

Fig. 2 is an end view of one of the rooms, as seen from its rear, with the ventilator v entering through its roof, and the arrangement of the berths h for the men.

Fig. 3 is a view of one of the rooms and its approaches, as seen from over x, the center of the gun-pit, and the openings or passages w', which lead to the wells w'', in which the counterpoise-work w is to be seen. The double arch represents the larger one, m^2, over the room, with one end resting on one end of the arch n^3, over the passage-way, which adds to its strength and the height of the room. The flooring of the rooms and passages is a little inclined toward the gun-pit, so as to carry off any water from them into the drainage-pipes, or, if there be none, into a receiving-tank, which must be pumped out, ship-fashion, whenever occasion may require it. There never will be much to get rid of, as an awning over the mouth of the gun-pit will protect it from dampness and from the sun.

Before filling in with sand or earth after the rooms are built, main torpedo-wires (and a plenty of them) must be laid, and, if near a city, gas-pipes and water-pipes. If the battery be built on a hill, waste-pipes must be laid down first of all.

If it be difficult to go deeper than twenty feet to build this battery, the rooms must run far enough back to gain the space wanted for cellars and two tiers of berths. Their height must be reduced, if need be, to three feet, so as to obtain the greatest thickness or depth of earth over them, and in any case—in this one particularly—it is desirable to have sand for this covering, instead of the earth in which the battery is sunk, whatever the expense or trouble may be to get it, it being so far superior, owing to its elasticity, as a covering.

It will be necessary to go deeper than twenty feet for the wells for the counterpoise-weights, so as to secure their safety. Should water be encountered, then water-tight wells must be made, and the diameters of the weights must be increased, and they be made of lead, so as to have the greatest weight encompassed in the smallest space. In other cases solid cast-iron blocks, or, if ample space is at command to work them in, then sheet-iron or heavy oaken buckets, which, being filled with water, will prove far cheaper and accomplish the same object. Six weights are used in this instance, because the diameter of the gun-pit (thirteen feet) will not admit of a greater number, and to provide the necessary passages, (twelve;) but with a greater diameter to the gun-pit a larger number of counterpoise-weights can and must be used to bring as many points of support to bear, and as near together as possible. Whatever the diameter of the gun-pit may be, the passages must be large enough for their intended purposes. They need not be built in proportion to any increase in the size of it. d^2, deck-beams extending throughout the battery.

Fig. 4, Sheet 2, represents the gun-pit with the platform in place and both guns mounted. Over all of this work, excepting the gun-pit, earth or sand will be thrown, and the surface leveled off and turfed, if necessary, to make its locality and surrounndings appear as before any such battery was built. It will then require an English pointer dog to find it.

x^2 are large blocks of stone in rear of the slides, as, on firing, the force of recoil comes directly upon them, and weight in them is required to resist it. The additional stone packing Z^5 is to get all the solidity possible about these points. At other points where this recoil is not felt large blocks of stone are not needed; and if the battery were constructed of wood, with its parts bolted together, the mutual support afforded by all these parts as one solid body would obviate the necessity of using such heavy weights behind the points indicated. y^2 is smaller stone, or even a single brick, in the spaces between x^2. y^5 is its stone packing also. In this case the pressure comes from without, and heavy work is unnecessary, the arch shape of the gun-pit giving the requisite strength. The fitting of these stones or bricks y^2 must be neatly and securely done, and be smooth on the inner (gun-pit side) facing; or one-inch planking might take the place of the stone y^2, and solid blocks of timber that of x^2.

In some localities it may be necessary to use wood in the entire construction of the rooms and gun-pit—in fact, of the battery—the only objections being the liability of destruction by fire, and in time by decay. For temporary works, which will seldom be occupied, it will be best and cheapest to use wood.

When digging out a gun-pit in certain soils it will save time and money to tunnel out the rooms, which, being built of timber, log-cabin fashion, and the earth packed over and around them, will not take long to construct.

R^4 are rammer scuttles or pipes, in which the ends of the rammer and sponge-handles are introduced, and their heads in the bore of the gun afterward. Any number may be laid. The rammer-handle may be kept always in this pipe, the working or outer end near the gun being so fitted that a sponge-head can be exchanged from it for a rammer-head, and vice versa, which will prove convenient, and save much time in the small space afforded to charge muzzle-loaders. If it be inconvenient to point the gun fair for these pipes for loading, the jointed rammer $j\,r$ and jointed sponge-handles $j\,s$ may be used. They are not inconvenient by any means, and might well be in-

troduced to work the lee guns of small vessels of war in a heavy seaway, or when they are rolling deep when running free.

s r is a jointed sponge and rammer handle combined for use for breech-loaders. The guns in these figures are supposed to be forty-pounder breech-loading Armstrongs.

In Fig. 4, s^{10} is the gun-slide, upon which the two guns are mounted, working on a common center, P, or the platform P'. The training-trucks move over the gun-circle g^6, as indicated, and an inner one is also shown to give greater support to the slide above its center, where the greatest strain is felt at firing, the slide being an inclined one.

r' is one of the six upper friction-rollers on the ends of the platform-frame; r'', one of the rollers on the lower end of the slide, near E and F, Fig. 7. On each side of r' and r'' are smaller rollers, to overcome the binding which may take place there. The little play of one-tenth of an inch between the ends of platform-slide and the grooves in which they work admits of so little incline to the slides, or rather they are so little off the perpendicular, thereby making such a very minute angle with the faces of the grooves in which they work, that the friction brought to bear does not amount to much; and where the grooves and slides are of hard wood, it may be best not to use these friction rollers, which will wear away a wooden surface, but plenty of good axle-grease.

In Fig. 4 are three ladders, n^6, and three ammunition-scuttles, A^s. Howsoever the gun-slide may be turned, one ladder and one scuttle will always be perfectly free and clear for use.

A tackle hooked to a crane, C^2, Fig. 8, passes down through A^s to and abreast of the magazine-door at the bottom of the gun-pit, where a man uses it to hoist ammunition up to the men on the platform. As soon as the charge is landed on the grating out of which A^s is cut, the covering over A^s closes it. The tackle is then unhooked from the crane C^2 and dropped on the platform, where it remains out of the way, as its slack pays itself below through an opening in the lid over A^s, and the crane C^2 is then shut within the wall to allow the platform to pass before it. I have so fitted one; but a better plan would be to step the crane perpendicularly on the platform itself, as it could not then jam, and would not have to be touched excepting when pointing the gun.

Fig. 5 represents the battery completed and ready for use, the gratings over the ladders being in place, one gun run out and the other run in, to show the space they require to work in.

x^c is the inner rim of an iron plating over edge of the gun-pit, which, projecting over it a little, decreases the diameter of the opening about a foot, and shelters the grooves, slides, and friction-rollers from the weather somewhat, and protects them from dirt and loose sand. The platform does not reach this iron plating when up, as S', Fig. 7 or 8, will show.

x^d, Fig. 5, is the outer edge of this rim of iron plating, its upper surface being flat and flush with the surface of the earth. This iron plating or finish is given in permanent works; but elsewhere will be seen reasons for another mode of finishing off the upper portion of the battery in cases where they will be temporary structures, or for field service.

To further lessen the chances for receiving injury from plunging shot, I have in Fig. 6 an iron covering, T, say two inches thick, fitted flat over the mouth of the gun-pit, it being let into the rim between x^d and x^c, where it rests upon rollers or shot, and is revolved by hand by means of a crank, so that the opening Y Z *u* W be kept always over the guns, and fair for them to pass up through for firing, when, if it be desirable, the guns being below, this opening Y Z *u* W may be closed entirely by slides underneath on the sides Y Z and *u* W.

If two inches is thickness enough to protect the decks of iron ships of war, they being in some instances four hundred feet by sixty feet, it is very sure the thickness of T in this case will be more than is necessary; but it is given to allow opportunities to suggest a reduction in its thickness. When this covering is used, the space between its under side and the top of the platform upon which the gun works must be fully six feet two inches in the clear, which is easily obtained by raising the cheeks of carriages, and the training-trucks must be increased in their diameters.

I have given these drawings to explain the object I have in view. In case the platform goes up too high, higher cheeks to the gun-carriages, with the slides two feet higer than in the figures, would bring the platform lower, thereby adding far greater protection to the men, platform, slide, &c.

When this battery is above the batteries of an enemy, he cannot harm it, particularly if he is close. Other batteries cannot have this said for them. An enemy must knock away the hundreds of feet of sand between him and this to harm it. If he be distant from it, a plunging shot might strike about its edge. The rooms below cannot be harmed, and if the iron plating is used, as shown in this and Figs. 7 and 8, a shot could do no damage coming from a distance, and if it should strike in front of the battery, it would be turned off in its path by the sand alone.

If, instead of any of the iron plating referred to, (it being dispensed with,) the platform be constructed to ascend no higher than six feet from the surface, then from the point reached by it down to the foundation all the strength required in the construction of the battery will be needed and found, leaving from the top of the platform, when up to the surface (six feet) the only exposed portion of

it—the only portion liable to injury—to be built of the simplest and cheapest materials, sand and canvas.

Place a sufficient number of wooden or iron stanchions along the upper edge of the work as far as completed, to preserve the shape of the gun-pit. Stretch one or more thicknesses of painted canvas around these stanchions, and fill in with sand behind them. The pressure of the sand or earth on the canvas will not amount to much, and a shot striking it will pass through the front and rear of the battery, making an almost harmless hole, which, with a needle, thread, and a patch, can be quickly repaired. No shot could reach any great distance below the surface, as the sand would turn it upward, and it could cut off the upper portion of the gun-pit only, making it doubtful if another ever would come so near, as the opening to it, being small, and lying flat on the surface, offers a minute object as a target.

If heavy iron plating be about the mouth of this fort, heavy projectiles would, on striking it, shake the whole structure, and do infinitely more damage than the harmless passage of one twenty-inch shot through it could do; or, if a shell should knock off bricks, or stones, or splinters, or enter the rear walls, and there lodge and burst, and do its work of destruction, it might be regretted not having built the battery to resist such projectiles, or making it so as to give a free unobstructed passage to them through it. In the one case, such a battery will cost half a million dollars; in the other case, a very few thousand dollars.

Suppose the whole top of the fort knocked off, the gun need not be hurt, nor the men, nor slide, nor anything excepting the point struck, when, under the cover of darkness, this damage could be repaired. The loose sand turned into the gun-pit could be stored away in the rooms until the opportunity offered to remove it.

This battery is cheap every way, but particularly is it so at the only point where it can be harmed by any direct firing; and when mortars are brought to bear upon it, by erecting an ordinary bomb-proof over the mouth of the gun-pit (the only point a mortar could harm it) its guns can amuse the enemy by firing from underneath it.

Fig. 7, Sheet 3, represents the gun in position for firing.

The line from A *a* to B *b* represents the surface of the earth; *v*, the ventilator down through the roofs of the rooms serving as quarters.

The gun being ready for firing, the ventilator-trimmer is removed and a bull's-eye screwed into the pipe, so as not to shut off the light.

At *z'* in the center grooves are openings in front of two of the counterpoise-wheels, (now they can be seen, as the platform is up,) through which the counterpoise-chains c^6 pass, thence over the wheels down into the wells *w''*, where they are secured to the weights *w*. All the space under A *a* to B *b* down to m^2, excepting the interior of the gun-pit, is filled up with earth or sand. *a*, side view of a room, with bunks *h*, flooring d^2, and under it (*a''*) provisions, *p*.

The platform being up, the weights are resting on the blocks *b'''*, so the upper part of the platform at A and B touches nothing.

In this plate or figure is seen the advantage of suspending the platform from the lower ends of the slides at E and F and the necessity for having the blocks *b'''*.

S' is the filling in of the groove S' at its upper end, as it is useless at that point, excepting to ship and unship the platform.

The gun, being over the point A, binds it there, and at the opposite lower end F; but the rollers *r'* and *r''* relieve this when the platform is in motion. The longer, therefore, that A E and B F can be, the less friction there will be to overcome, and the little play of one-tenth of an inch between the slides and the grooves will have a longer space to be divided into, thereby bringing the pressure more nearly in a straight or direct line, when, if the distance A E were one-fifth, say, as great, the amount of friction to overcome would be a very serious matter in any case, and, where very large guns are mounted, would be almost insurmountable. Instead of a platform like this, an iron cylinder might be suspended, the upper end being decked over, the gun placed upon it, and such interior arrangements of supports made as to secure its solidity and safety. Grooves in this case would be as necessary as guides in the case spoken of, for the platform would not follow in an upright position the direction taken by the counterpoise-chains, it being slung on the bottom. L^4, light-room.

I will now leave this figure for the next one, Fig. 8, as the explanation of what remains in this one will be found in the other.

Fig. 8, Sheet 4, represents the gun in position for loading. A *a* to B *b*, the surface of the earth; *v*, ventilator-pipe for magazine and shell-room, with its branches *m* and *n* leading into them through their rear walls. At *m n* an opening is left for water to pass out into the ground. The reasons for leading this differently from that in Fig. 7 have been given. The trimmer in this case (gun being out of use) is in place; but in the event of battle it will be unshipped and a solid metal cap screwed into the upper end of the ventilator-pipe in its place. S''', an iron plating extending far enough over the upper edge of the gun-pit to give protection where repeated blows (if received) from heavy projectiles fired from great distances would mostly do their damage about the upper edge of the gun-pit. It also adds to the protection to the rammer-pipes R^4, being near the surface, and the arches B^1 over the counterpoise-wheels w^4.

S are the grooves in the walls of the battery, in which the ends of the platform-frame, fitted to slides A C E and B D F, work, and to which

lower ends, near E and F, at c^8, an iron bolt is secured, which, working in the space c^5, has the lower end of the counterpoise-chain c^6 attached to it. By this means the platform, when in motion, cannot be jammed by it, (the chain.)

S′ are wooden blocks let into the grooves S at their upper ends after the platform is in place. They assist in keeping dirt out of the grooves S, and regulate or mark the upper limit to where the platform must go. If the blocks b''' were not used, S′ would prevent the upper ends of platform-frame timbers from striking the iron rim near x^6, and, besides, loosening the work at that point. If the platform should rush up too rapidly and too far, it would do great damage to the counterpoise-wheels, chains, &c.

The faces of the grooves S have iron strips bolted upon them to take the wear from the slides. Wooden slides (unshod) working in wooden grooves would prove as handy and cost less money.

The platform-frame A B C D E F is so constructed that it will be kept always almost perfectly horizontal. The longer the slides A to E and B to F the easier it will work, and the longer the slides the lower down the wheel w^4 can go—a very great consideration. In the figure will be seen the result if the platform were slung at C and D, or at A and B.

The diagonal braces M N O H, with iron knees in the angles at the points they meet the platform-frame timbers, are bolted through to their opposite ones; so, too, at every intersection of any two timbers in the construction of this platform, which makes it impossible to yield or work, notwithstanding the heavy weights upon it. By crossing these three timbers at a common center to have the six frame ends, Fig. 4, great weakness is caused where great strength is needed. To restore this strength, a stout wooden block, K, is placed between them, its ends extending between the frame-timbers. Iron bands run from along the under side of the platform-frame timber down this block K, and overlap the upper side of the lower frame-timber. The pivot-plate bolts through this iron strap at k, through K to its opposite one, and through k' and the iron plate L on under side of second or lower frame-work. The strain now comes end on, and on the ends of these iron bands, which, being bolted through K, cannot yield, and this point, which was once the weakest, is now the strongest. The weight of the guns may rest over the center or on their training-trucks, which work on the ends of the uprights A E and B F at A and B.

When using inclined slides it will be well to relieve the center of the slide of some weight from the guns, as on firing greater strain is brought to bear upon it about the pivot than would be the case if a horizontal slide were used; but, the platform being nearly balanced, any undue strain upon it would cause it to yield to it, thereby escaping straining. K′ is an iron rod, secured at L and the lower ends of the slides, to prevent the drawing or binding of these ends too tightly against the faces of the slides S. C^3 is the gun-carriage; S^{10}, the slide for both guns; P, the pivot-bolt; P′, the upper side of the upper platform, which is decked over, while the one between D and C is open; R^5, the inner ends of the rammer-pipes; R^4, the pipes themselves, the outer ends being tightly closed to keep the sand out; L′, stationary ladders, (three of them altogether,) extending from the surface to the bottom of the battery, and are bolted to the sides of the gun-pit; n°, ladders on platform, which move with it, and from them to L′ any one can step, wherever the platform may be; r', rollers on the upper side of platform at frame ends; r'', rollers on the lower ends of slides S″ marks the lowest point reached by the grooves S, so that when the platform is down there is any quantity of room under it. r is the tap for water over the tanks in the cellars a''' g''' f''' e''' d''', &c.; w', passages under the small arches to reach the weights w in the wells w''. The space w''' about the counterpoise-wheel w^4, and covered by the arch B′, can be reached by means of the counterpoise-chain which comes down from it, should any cause exist to require a visit to it; but if any break occurs about the wheel w^4, instead of removing any portion of the walls of the battery, one must remove the sand above the stone O′, covering the entrance to the space w''', in which the wheel w^4 is. On getting down to O′, remove it, do the required work, replace these stones, forming a slab, and throw the sand back into its place again. A″ is a heavy block of stone, which being placed at the end of A′, the wooden blocks upon which the counterpoise-wheels work keep them in place, A‴ being packed in between A″ and O′ to give greater security to it. The counterpoise-wheels are mounted on the stands z, they having anti-friction rollers attached, upon which the bolt upon which the wheels w^4 revolve works. The blocks almost cover over the upper end of the wells w'', leaving, however, space enough between them for the counterpoise-chain c^6 to pass. The room c is the shell-room. m^2, top of arch forming its roof; n^3, top of arch over the passage-ways; L, iron plate with six branches, one under each platform-frame timber, and bolted through it to opposite fastenings. In the center of it (L) is an eyebolt, to which the rope (three-inch hemp) c^r is hooked, which, going over the barrel of the windlass c^w, enables one man with one hand, if need be, to haul the gun down below the surface after discharging for loading again. Two revolutions of c^w bring it out of sight, when it may be lowered farther, or not, at leisure, if it be desired.

It is not necessary to lower the gun for loading. It can be kept as in Fig. 7 until its safety is threatened, when, within a second of time, it can be drawn down out of sight.

To elevate it, throw the barrel of the wind-

lass out of gear, when the weights will rush it up to the surface; then, by pressing on the lever *l* at rear of carriage, the eccentrics and forward trucks are thrown into action, and the gun runs out quickly into battery. Now throw up the lever, unship it, and the carriage resting on its cheeks is ready for firing. The weight of the officer and four men required to work the guns, and who must always remain on the platform, is included in the allowance to be made in the counterpoise-weights. The pivot-bolt P, making a common center about which the two guns revolve, thereby giving them an all-round fire, is an advantage no other fort possesses. Three of these batteries having two guns each will nearly always offer a front of six pieces toward any point, while with other fortifications sixteen guns are required (four on each front) to accomplish the same thing. L^4 is the light-room. *x* is the post planted under the center of the gun-pit, and 2*x* is the shelf, weighted to further prevent its being lifted out of place should any extraordinary weight be brought to bear upon the lowering apparatus c^w, from which it receives its greatest support.

Fig. 9 shows end view of the wells *w''*, in which the weights *w* work over the wheel w^4 under the arch B'. The space *w'''* will be large or small, according to the size of the wheels w^4. The lower arch under the wheel is necessary to procure strength at the point where the whole strain for supporting the combined weights of the platform, guns, and counterpoises is alone felt and borne. A', end views of the timbers on which the wheels w^4 work in their stands *z*, which are bolted to A'.

Fig. 10 looks down upon the upper end of Fig. 9, the arch B' being out of the way. Every thing will be recognized here without further description.

Fig. 11 is an end view of the slides (two out of the six) of the platform. The end of the counterpoise-chain c^6, being fastened at the bolt c^8 and led along up the center of the face of the slide, passes through *z'*, Fig. 7, over the wheel w^4. The upper platform-frame between A and B^2 is decked over; but the lower one, C to D^2, is not. The space between A and B^2 and the other five spaces require the support given by the diagonals M' N', which being bolted at the point m^4, their lower ends step near C and D^2, straddling the point of intersection of the timbers near C and D^2. This completes the solidity of the platform. n^9 is one of the three platform-ladders.

A cog-wheel training-gear will be necessary for use with large guns, while smaller ones can be pointed by hand or with handspikes.

The roof T, Fig. 6, if made lighter, might be made to revolve with the guns.

A turret to withstand the blow from a twenty-inch shot would cost, with the gearing for revolving it, quite two hundred thousand dollars. It will be cheapest in the end to risk the striking of the gun during the few seconds it will be above ground, rather than expend this sum for a turret. A light iron covering to elevate and lower with the platform, and to maneuver with the slide, might be used to protect the men from sharp-shooters; but even this is hardly necessary, as every one is below the surface excepting the officer who sights the piece, and as he uses a trunnioned sight having an iron shield over and in front of it to protect him, additional protection will not be needed.

If this battery should be placed where the guns will always be fired at high elevations, it will be best to use a horizontal slide with compressors rather than the inclined one, as the strain brought to bear upon it would soon tear it to pieces.

In the defense of the coast, where the attacks will be made from northeast to southeast, the opposite or rear edge of the battery may be made lower than the front, as a dropping shot just clearing the front might also pass harmlessly over the rear edge also. Its efficiency for defense against attacks from the rear or on the flanks will not be impaired, as the gun can be revolved to work over the rear walls also.

A speaking-tube (upper part flexible) must lead from the platform to the magazines.

To construct this battery on a reef, or in a marsh, it will only be necessary to make the gun-pit water-tight, supply it with pumps, and provide copper tanks for the stowage of powder. Such a battery in either of the above locations would give great trouble and be very difficult to reach, owing to its natural surroundings, and exclusive of the dreaded torpedo, which will ever be its chief dependence for support and protection.

If one or more weights become disabled by the shooting away of any one of the cross-pieces of the platform, its weight or their (counterpoise) weights can be divided among the remaining ones, when it will work as before. Weights for division among the others in the event of such misfortune should be a part of the outfit for the battery. The platform will raise and lower with but three counterpoise-weights in use, double weights being used.

One lamp placed at night in the center of the battery will equally light every room.

If two inches thickness in the iron plating over the decks of ship is considered sufficient, they being in some cases four hundred feet by sixty feet, one inch thickness over a wooden cover should be sufficient in the case over the gun-pit of this battery, it being so very much smaller, (thirteen feet only;) and, what will be more desirable, a large wrought-iron grating, fitting in lieu of the solid cover, might be used.

Shot from mortars or from guns at great distances, fired at high elevations, alone can do damage to such a cover; and if there is one or not, a shot entering the gun-pit is not necessarily compelled to do any serious injury, as by passing between the frame-timbers

through the gratings the loss of a ladder only might be the result. The chances to strike into so small a hole are so slim that it will be best to use the money which may be expended in providing unnecessary protection to one battery to the construction of a dozen other such batteries.

Steam or hydraulics might be used to work this battery; but its cheapness and simplicity will be destroyed, while greater efficiency will not be added.

As it now stands, a raw recruit, after once seeing it in operation, would thoroughly understand it, and be mechanic enough to remove or repair any irregularity in its working.

To build this, and then hold it, costs but little, while its loss will be confined to its cost only, for it can be disabled by its own people so quickly and thoroughly as to make it impossible for the enemy to use it to his own advantage. If any one battery be threatened by the enemy, its people can retreat to their rooms below, previously lowering the gun, while the other batteries can concentrate their fire upon the enemy about it. No other fort or battery could be thus protected without doing damage to it own garrison.

The guns are fired as rapidly on these platforms as they can be fired if otherwise mounted, while the feeling of security which its men experience enables them to use their guns effectively at all times.

Racks for small-arms are placed in the passage-ways.

Electrical and other torpedoes protect all the approaches to this battery.

Additional men can be accommodated by slinging cots for them under the platform and in hammocks in the passages. Ample room for their stowage during the day is to be had in the cellar under the gun-pit.

Lead pipes lead through the walls of the gun-pit from just above the platform, when it is lowered, to the pins upon which the counterpoise-wheel works.

Conveniences in the shape of lockers are put up over the men's berths, Figs. 1, 2, 3, and 7, and the officers' rooms furnished as necessity requires.

If it cannot be gotten otherwise, one of the many small gas-machines in use should be provided for these batteries, to furnish light and the means for cooking.

When the battery is not in use it will be well to relieve the counterpoise-wheels of the constant strain brought to bear upon them. First land the weights w^4 on bits of plank on the blocks b'''; then shove up (the fractional part of an inch will do) the center at L, and the ends of all the slides at F. In an instant they can be removed and the battery made ready for service.

For field service: The guns being small and their (batteries) need but temporary, greater simplicity in the construction of them than in that of permanent ones may be followed. Instead of the platform shown, make the field-service ones like form C D E F O H, Figs. 7 and 8. The frame to sling this upon, including wells, grooves, &c., must be made of wood. When finished, it should be put up on the surface to see that everything is complete, then taken down and stored in the arsenal until wanted, when it can be transported to the point to be fortified, where, digging its pit to receive it, it can be made ready for service within twenty-four hours.

Rooms are not required, as in larger batteries, and the ammunition-chests can be stowed in the bottom of the gun-pit and between the wells for counterpoise-weights on the side next to the enemy, where they will be out of harm's way.

The horses, caissons, and limbers, which otherwise would be exposed to injury, can be removed to places of safety, or be used with other guns in other localities where shifting batteries may be required.

The Gattling gun so mounted (on a counterpoised platform) would have its efficiency greatly augmented.

No lowering apparatus is required with these light guns, excepting short lines fastened to the platform-frames, by which the men below can pull the guns down for loading. A longer one amidships to retain the platform in position, by securing it to the end of an ordinary post driven in the ground, will alone be necessary.

Should an enemy desert this portion of the field, the guns can be transported on their field-carriages.

It is not the whole cost of any one of these batteries which is to be considered, but the difference between their cost and that of other batteries, and in field service the saving in material will more than pay for them.

Electrical torpedoes will be used in their defense.

In rivers and harbors these batteries can be used on iron-plated vessels advantageously, and to have these vessels steamers are not necessary. Expensive turrets, which offer too fine a mark to shoot at, are avoided, and the gun is brought down so near to the surface of the water as to make it as difficult to be struck as to be seen. It has, too, a great advantage for ricochet firing, which, in smooth water, in a fog, at night, or when the direction only, and not the distance, from an enemy is known, will prove invaluable.

Having thus described my invention, what I claim is—

1. The combination of the platform having uprights A E and B F, &c., with the weights w and pulleys w^4, as set forth.

2. The combination of the platform having uprights A E and B F, &c., with grooves or ways S and Stops S', substantially as set forth.

3. The combination of the elevating-platform (carrying the gun) with the rammer-pipes R^4, substantially as shown.

4. The combination of the platform having uprights A E and B F, &c., with the weights, pulleys, and windlass, as set forth or shown.

5. The combination of the platform A B with the skeleton-platform C D, as set forth.

6. The combination of the platform A B with the platform C D, the braces M and N, and the center-post K, as set forth.

7. The combination of the uprights A E and B F, &c., with the skeleton-platform C D and braces O and H, substantially as shown.

8. The combination of the elevating-platform, upper rim x^c x^d, and the shield S‴, as set forth.

Witnesss my hand in matter of my application for a patent for a counterpoise-battery for the protection of cannon in coast defense and the field, and also on board iron-clad gunboats for river and harbor defense, this 24th day of December, A. D. 1875.

BEVERLEY KENNON.

Witnesses:

JNO. S. SLATER,

CHAS. H. MOULTON.