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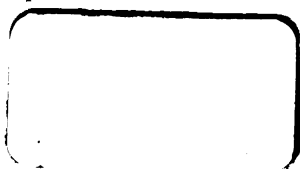
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A  
**DESCRIPTION**  
OF  
**THE SIGHTS.**



A  
**DESCRIPTION**  
OF  
**The Sights;**  
OR,  
**INSTRUMENTS FOR POINTING GUNS,**  
PROPOSED BY  
**MAJ. GEN. SIR W. CONGREVE, BART.**  
FOR  
**THE USE OF THE NAVY,**  
OR  
**FOR HEAVY ORDNANCE**  
IN  
**BATTERY;**

*With Instructions for using and adjusting them.*



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**1818.**



TO  
**LORD VISCOUNT MELVILLE,**  
&c. &c. &c.

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**MY LORD,**

The constant encouragement which I have experienced at your Lordship's hands, since your administration at the Admiralty, in the various matters which I have had the honor to propose for the improvement of the armament of our Ships of War, demands of me some public acknowledgment.

I am induced, therefore, to avail myself of the opportunity now afforded me, by the printing of the following pages, which I have found

it necessary to prepare for the general understanding and explanation of the system of Sights for pointing naval ordnance, the organization of which for adoption in the Navy, under your Lordship's patronage, has been confided to me.

I have the honor to be,

MY LORD,

Your Lordship's faithful Servant,

WILLIAM CONGREVE.

## DESCRIPTION OF THE SIGHTS, &c.

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A certain number of these Sights, or instruments for pointing guns, as proposed by me, having, through the recommendation of Admiral Sir George Hope, been ordered by the Lords Commissioners of the Admiralty to be prepared for service, it becomes necessary for me to draw up some description of their application and uses, and for that purpose these pages have been printed.

Some simple and efficient instrument of this sort has long been a desideratum for the naval service, and various attempts have been made to apply detached Sights on different parts of the gun, commonly called Disparts, some cast on as in the carronades, and in my construction of 24 pounders, and some only occasionally affixed, which being brought into a line with the eye, should give the direction ; but the difficulty of getting the seaman to bring these detached parts to coincide, without some intermediate guide, has been such, that none of

them have been found satisfactorily to answer the purpose, and something further, therefore, was yet desired.

In pointing a gun properly, two things must be accomplished, the lateral or horizontal point or *aim*, and the vertical level or *elevation*, due to the distance from the object; and the desideratum is to accomplish both these points by *one single operation*, and that with the greatest ease and certainty.

The Quarter Sights are a most imperfect system, though so long in use; and although, to accommodate them, it is believed the trunnions of all our ordnance have been placed below the axis of the piece, from which many evils arise, it is scarcely possible to point a gun in motion, that is to say, on board of ship, with these Quarter Sights, because, as they involve a *double operation*, while the eye is directed to ascertain the due level or elevation, the lateral point or aim is lost sight of, and *vice versa*.

During the late war, the Americans used a long strip of wood, with a groove upon the upper side of it, which was fixed on the gun, so that

the groove was always parallel to the axis of the piece. But this sight gave only the point blank, and was therefore evidently very imperfect; it was of little use beyond 300 yards, and principally to obtain the lateral pointing of the gun, rather than its elevation. It was imperfect also in having nothing to confine the eye to the true level of the groove.

In offering, therefore, some more perfect and equally simple mode of pointing guns, with a view to obviate the foregoing difficulties, I have in the first place contrived a long Sight, ABC, plate 1, fig. 1, made of iron or brass, which is attached to the gun at one end by the foot A, with a pin, or screw, at D, and at the other end by a strong iron shackle B, connected with the vent field by one of the same screws that secures the lock: so that having a joint at A, and various holes in which the shackle B can be fixed, it may be set either at point blank, as delineated in the plate, and indicated by the graduated scale on the instrument from PB (point blank) to  $5^{\circ}$ , as shewn by the dotted lines. The top of the bar ACB is grooved, or it may have a tube equal to its own length, with cross wires, upon it, or a ring, with cross wires, at each end. The tube and rings

may be of a convenient size to catch the object, and the position of the instrument being fixed to any degree on the scale, the gun will, by construction, be elevated at the same degree, with reference to the object, whenever this object is centrically seen in the field of the tube, or that of the double rings; and if the piece be fired at that moment, it is obvious that the shot must be well directed both as to *elevation* and *lateral point*, for it must be observed, that unless the eye is confined down to the level of the groove, either by the tube or rings, although the object may appear directly at the end of the groove, so as to give the true horizontal point, no dependence can be placed on the elevation; on the contrary, if the eye be too high above the groove, though the gun may appear to be most accurately laid, and may be so, as to the lateral point, it may, by the roll of the ship, be elevated 3, 4, or 5 degrees, when supposed to be at point blank: and it is evident, that in a naval action the elevation is even of more importance than the lateral pointing, because it is much easier to fire over or under the hull of a ship, than to miss it altogether from stem to stern. All accuracy of shooting therefore must depend principally upon firing, when the gun is at or

very nearly at the true elevation due to the distance, which the mere grooved Sight above-mentioned is unquestionably insufficient to attain with certainty; and for which purpose, therefore, I have added either the *tube* or the *rings* as indispensable for keeping the eye to the *true level* as well as direction. Experience will determine which is the best, but it appears that there is no difficulty involved in either; for the elevation of the gun and sight being adjusted to the distances, and the tube and rings being of due size, if the general direction of the gun is given by the training tackles, the motion of the ship will soon bring the object into the field of the tube or rings, the length of the groove directing the eye, while the seaman watches his opportunity of firing; and certainly if he fires, when the object is *not* in the field; the shot will inevitably be thrown away, unless it be in close action, where any great nicety of pointing is of little consequence compared to the quickness of firing; and here it may not be amiss to observe, that although it is generally supposed there is greater difficulty in laying a gun afloat than ashore, there does, in fact, exist a facility on board ship, which is not to be found ashore; for the very motion of the ship, which is supposed to create trouble, does,

in fact, both give the elevation and the aim, and requires only attention on the part of the gunner to watch the moment for firing; whereas on shore the whole operation of laying the gun must be done by hand.

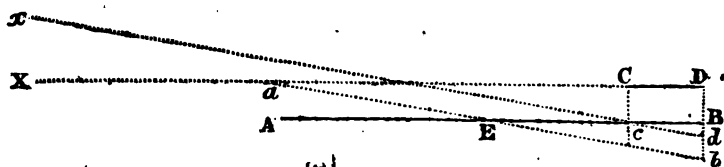
Fig. 2, plate 1, is a shorter sight of similar principles, either with the groove, tube, or rings: it is fixed in front by a bolt or screw in the first reinforce, and in the rear by a fork, embracing the vent field to which it is screwed by the same screws as secure the lock; the different angles of the sight are given by means of two limbs, connecting the fixed and moveable parts of the instruments, something similar to the connecting limbs of a parallel ruler, but which *not* being *equal* in length as they are, instead of giving parallelism, as the parts separate, give all the gradations of the different degrees from PB to 5°.

All that has been said of the Sight, fig. 1, applies equally to fig. 2, which has the advantage of greater portability, and perhaps of being less liable to accident from its being more compact, and possesses, as I conceive, sufficient length of tube or groove to lead the eye readily into the true situation for taking the aim.

In fact the conviction, that by means of the tube or circles, length might, in a great measure, be dispensed with, has induced me further to construct an instrument, fig. 3, still shorter than the foregoing one, though on the same principles; this, like fig. 2, consists of a fixed and moveable part, connected by unequal limbs; the lower part is applied to the side of the vent field, opposite the lock, and secured on by the same screws, and occupies not much more space than the lock on the opposite side; it serves, like the others, to lay the gun, when elevated at any angle from PB to  $5^{\circ}$ .

It may here be necessary, for the information of some who have not previously considered the subject, more particularly to explain the principle of the operation of these moveable Sights in the laying the gun at different angles. The Sights here described are, as above stated, only calculated to extend to an elevation of  $5^{\circ}$ ; that is to say, if the gun were elevated to any greater degree, its muzzle would intercept the sight of the object: for it is evident that, as the muzzle of the gun is elevated and the breech depressed by altering the coin or elevating screw, the Sight, which is fixed on the breech, must be raised by the

means above explained for that purpose to clear the muzzle, and the requisite quantity is marked on the instrument, degree for degree, to preserve the level of the Sight, so as to keep the object in view in all the different positions of the gun. In ordinary cases the line of sight is always supposed to be horizontal, and especially for naval purposes, while the line of fire intersects the line of sight at the angle at which the gun is elevated, these lines being parallel only at point blank ; consequently, if there were not a corresponding motion in the Sight as the gun is elevated, the Sight, instead of being still directed to the same object, as at point blank, would be elevated in the air. This corresponding motion therefore in the Sight becomes the measure of the gun's elevation, and indicates it by the graduated scale.



Thus in the foregoing Diagram—if AB be the axis of the gun at point blank, and CD the line of sight, viewing the object X parallel to the axis at point blank, then if the gun be elevated into

a new position,  $ab$ , and no change were to take place in the relative position of the Sight, but that it should remain as at  $cd$ , it is evident that  $cd$ , produced, would lose sight of the object  $X$ , and be directed to  $x$  in the air—that  $CD$  therefore may still bear upon  $X$ , its distance from the gun must increase from  $DB$  to  $Db$ , as the gun is elevated; and the angle  $D a b$ , which the Sight makes with the axis of the piece, is always equal to the angle  $aEA$ , the elevation of the gun above point blank, and is therefore in all cases a true measure of that elevation.

Plate No. 2 gives a further explanation of the combined operation of the Sight, and the different elevations of the piece; at the same time that it shews the increase of range gained by increasing the elevation of the piece to the different angles from  $PB$  to  $5^\circ$ . The instrument applied is there seen to keep the same object in view at all the different angles from  $PB$  to  $1^\circ, 2^\circ, 3^\circ, 4^\circ$ , and  $5^\circ$ , elevation, and the shot is seen to make the different curves necessary to reach the same object at different distances, by the elevation of the piece to these different degrees. This simple diagram in fact may be said to exhibit the whole business of practical gunnery; and the annexed table of

practice gives the first grazes of the 32 pounder, 24 pounder, and 18 pounder guns, at all the degrees from PB to  $5^{\circ}$ , which is, I conceive, quite as much as is necessary for all the ordinary operations of naval gunnery.

The same principle of instrument might of course be extended to the laying guns to  $10^{\circ}$  of elevation or more; but it appears, as I have already stated, that  $5^{\circ}$  is sufficient, and to give more, I think the Sight would require to be raised to an inconvenient height above the breech; I have therefore limited it to  $5^{\circ}$  in all these instruments.

Admiral Sir George Cockburn has suggested that, in using the groove only, greater facility of pointing would be attained by carrying the long Sight, No. 1, as far as the muzzle; for this purpose, therefore, an additional piece is constructed to attach to the bar ACB, Fig. Plate 1. As far as relates to the lateral pointing of the gun, this addition may give greater facility in ascertaining when the piece is properly directed or aimed, but this additional length does not seem to be necessary, as far as relates to its being properly levelled or elevated, when either the

tube or rings are used; as the utmost parallax or error in the sight of the object could then, in either of those instruments, only amount to about  $\frac{1}{4}$  of a degree, *even if the cross wires were not used*; and this could make no sensible difference in the flight of the shot.

These instruments are all calculated to apply either to a 32 pounder, a 24 pounder, or an 18 pounder, by having different holes for attaching the bar of the long instrument, plate 1, fig. 1, to the foot A, according to the nature of the piece, and in the medium Sight, fig. 2, by having the bolt or screw in front, which attaches it to the first reinforce, so arranged that it may accommodate itself to the position of the reinforce in the different natures; while the short instrument, fig. 3, will suit either of these natures without any provision, the vent field being the same in all:

These different instruments are so contrived that they may be fixed to or removed from their guns in a very short time, and without the smallest difficulty.

It requires only a little attention to the adjusting them in the first instance, so that the

groove or cross wires of the tubes or rings may bisect the muzzle ; and to secure the easy recurrence of the adjustment whenever the instrument is to be replaced after removal, a bisecting notch may be cut in the muzzle and painted white, by which to make the adjustment : and the position of the instrument may be regulated either to the right or left as required, to make it intersect the notch, by thin washers of lead or brass between the vent field and the shackles or other part by which it is attached to the vent field. In fig. 3, as the instrument is not in the centre of the gun, the regulating notch must be cut as much to the left of the centre line of the muzzle as the instrument is to the left at the breech, so that its direction may always be parallel to the vertical plane of the axis of the piece, though not actually in that plane, as is the case with the instruments fig. 1 and 2.

The circles, or rings, and cross wire to be fixed at the extremities of the grooves, will be found to be of different diameters, that nearest the eye being the smallest ; and this is so calculated, that when they appear to coincide, as if of the same size, to the man about to pull the line for firing the gun, he may know that he is at a

proper distance from the gun for taking his aim, and moreover where he cannot be hurt by the recoil; for instance from five to six feet.

It remains only for me to state, that in making new guns, I should propose to cast them with a fixed triangular dispart, as in the medium 24 pounder of my Construction, because in the absence of either of the foregoing instruments, it becomes a simple and useful substitute, though falling short of true perfection; and it serves also as a permanent and certain fulcrum, by which to attach the long instrument in lieu of the moveable foot A fig. 1, plate 1; and indeed the foot A may be constructed of solid brass or iron on the principles of this Sight, as shewn by fig. 4, plate 1, giving all the degrees from PB to  $5^{\circ}$ , and dovetailed into the second reinforce of any gun already cast, so as to be almost as strong as if cast on, and to remain there permanently, acting either as a detached Sight or dispart by itself, or combining with the long instrument, as the fulcrum by which to fix it.

Before I conclude I must again urge my conviction of the absolute importance of the tube or circles as I have applied them to these Sights;

without something of this kind to confine the eye to the true level of the Sight, with the mere open groove, the men will be constantly deceiving themselves, and firing either under or over the object. They are naturally anxious to fire whenever the object appears at the end of the groove; but if that object is not so situated that it would be seen in the field of the tube or circles, at the same time that it appears at the end of the groove, they might as well not fire at all; for if, under these circumstances, they are more than 100 yards distant from the enemy's ship, the shot will inevitably miss, unless the object is so seen: whereas, whatever the distance may be, if the Sight is previously elevated and fixed according to that distance by the table in plate No. 2, and the object is actually seen in any part of the field of the tube or rings, when the gun is fired, the shot must infallibly take effect.

Nor does it involve more difficulty or consideration for the men to use the instrument at 1,000 or 1,500 yards than at point blank; for if engaging at 1,000 yards, then the officer will order the Sight to be elevated and fixed, and the coin to be adjusted to 2°; and the seaman has no more to do than catch the object in the field of the tube

or rings, exactly as if he were firing at point blank, and he is as sure of his mark; so if he is engaging at 1,500 yards, the sight must be fixed at  $4^{\circ}$ , the coin adjusted, and the operation of pointing and firing is in this, and indeed in every case, exactly the same as if engaging at point blank; nay, in fact, if the ship has any considerable motion, it is not of any material importance whether the coin be adjusted or not; neither can any disappointment arise from any alteration that may take place in the position of the coin in firing, so long as the object be seen in the field of the instrument; a circumstance which is constantly happening, and must always be attended with the most serious inconvenience without the instrument. The motion of the ship, combined with the instrument, gives the due elevation, and in this, as I have before observed, a facility of pointing heavy ordnance exists afloat, which does not obtain on shore.

I do not hesitate therefore to conclude by asserting, that without some well organized instrument for pointing guns on board ship, with any motion in the vessel, there can be no certainty of practice, even at 200 yards distance; and this indeed accounts for the comparatively small mis-

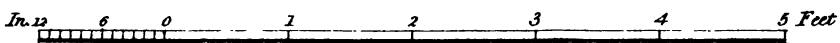
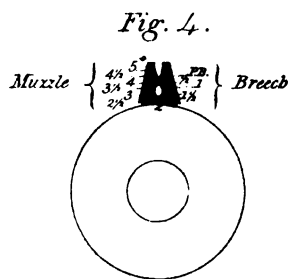
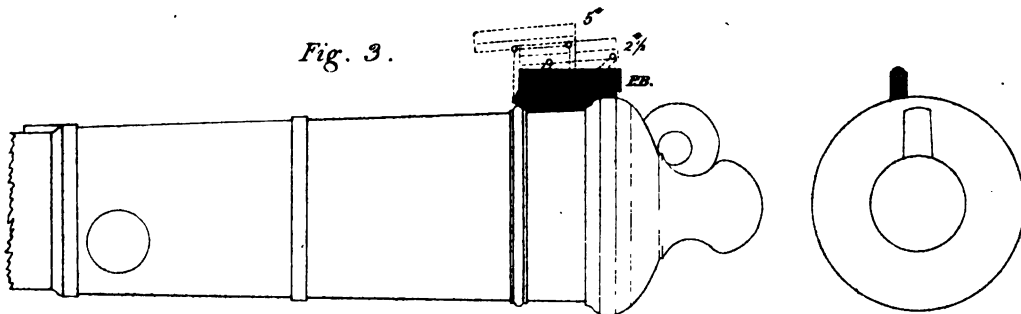
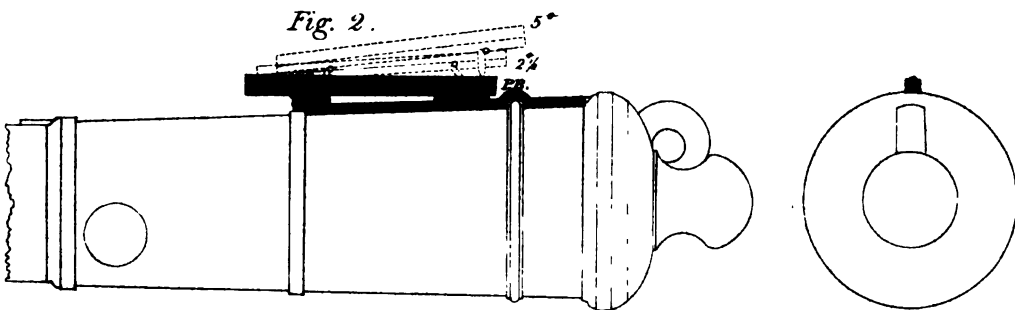
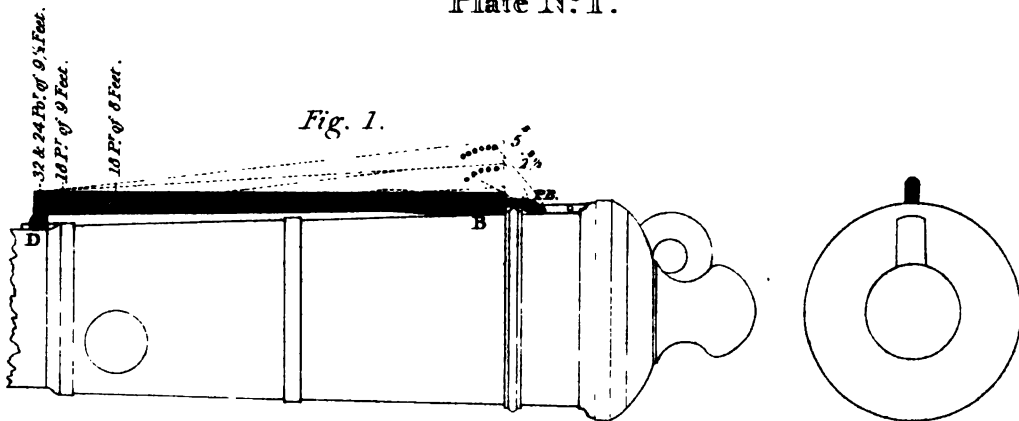
chief done in a naval action, with reference to the number of shot fired; whereas, by means of a Sight, which, while it gives the aim, will also give the level or elevation of the gun to a certainty, by confining the eye to its proper point, the practice at 1,000 yards, or even a mile distance, may be as much depended on as at 50 yards, and with no greater attention on the part of the seaman; he may perhaps fire a few shot less, by taking pains to catch the object to a certainty, but then every shot will tell, and although, as above stated, even at 200 yards, by the motion of the ship, a shot may easily go over the enemy, without due attention to the level of the gun,\* still it is evident that the having these Sights is no bar to quick firing, when two ships are so close alongside as to render it impossible to miss the enemy.

WILLIAM CONGREVE,

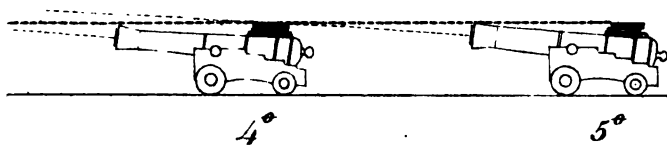
*4th Feb. 1818.*

\* Supposing the sights of a gun to be adjusted for point blank, but, for want of bringing the eye to the due level in pointing, to be fired when the ship has rolled 5°, the shot of a lower deck gun would pass nearly 30 feet over the hull of a first rate at 200 yards distance; and that of an upper deck gun 50 feet. This statement is sufficient to shew the importance of some instrument for securing the level as well as the aim of naval ordnance.

Plate N<sup>o</sup> 1.







1603

1730

1538

1807











6.



