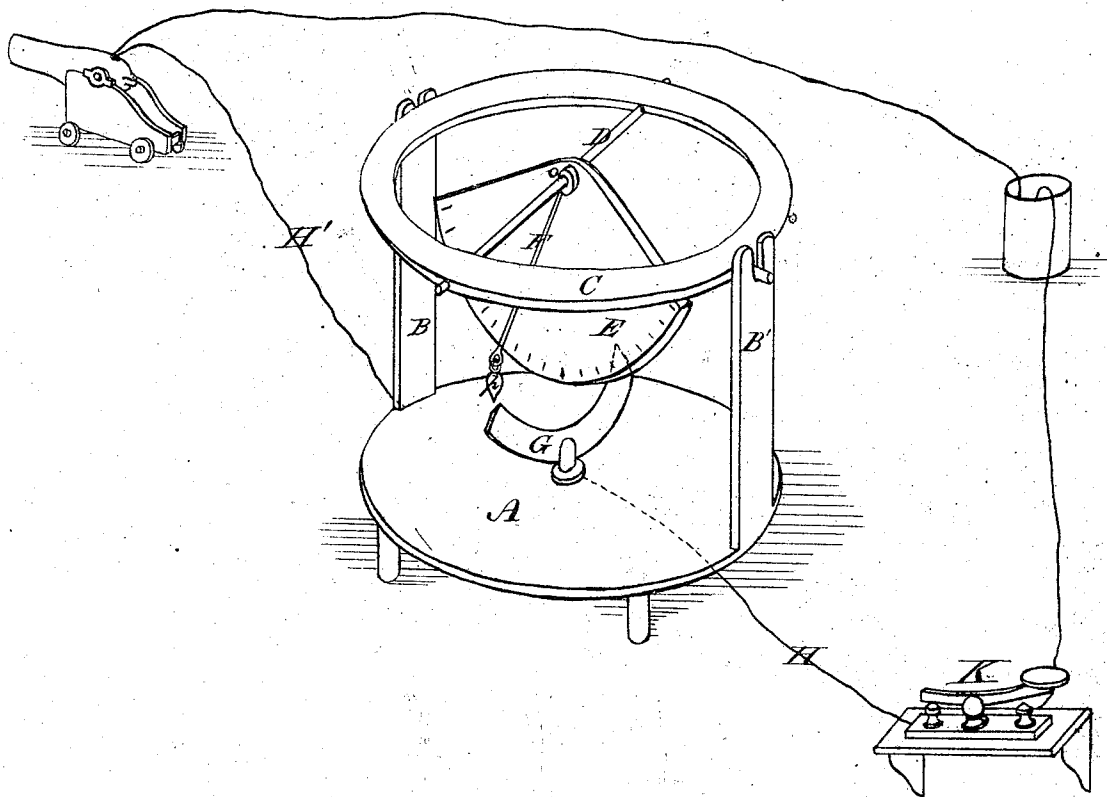


Henry Arden.
IMPROVED MODE OF FIRING GUNS.

No. 120,179.

Patented Oct. 24, 1871.



Witnesses,
Charles E. Bunker
W. W. Wright

Inventor,
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UNITED STATES PATENT OFFICE.

HENRY ARDEN, OF BROOKLYN, NEW YORK, ASSIGNOR TO JOHN C. SMITH, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR DISCHARGING ORDNANCE.

Specification forming part of Letters Patent No. 120,179, dated October 24, 1871; antedated October 11, 1871.

To all whom it may concern:

Be it known that I, HENRY ARDEN, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Mode of Firing Guns on Board Vessels of War; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon, making a part of this specification.

It is well known that the pitching or rolling of a ship at sea continually changes the angle of elevation of the guns, and it is very difficult under such circumstances to fire them at the proper moment. The object of my invention is to furnish a mechanical device by which the charge in the gun is fired whenever, by the rolling or other motion of the ship, the gun attains the proper angle of elevation, and I employ the unerring agency of a simple mechanism to perform what heretofore has depended solely upon the capricious judgment of the gunner.

I will proceed to describe the construction of my machine for accomplishing this object, reference being had to the accompanying drawing forming part of this specification.

A is the base of my machine. B B' are two upright standards, to which are pivoted, at points *m m'*, the ring of metal C. On the inner periphery of this ring, at points *n n'*, is pivoted the bar of metal D, the points *n n'* being each equidistant from the points *m m'*. To this bar D is fastened a metallic arc, E, of a circle, which circle has the center *o* of the bar D for its center. The plane of this arc is at right angles to the bar D, and passes through the points *m m'*. Upon this arc E are marked the degrees, minutes, and seconds of the angles of elevation, the zero line being that line which strikes the arc after passing through the center of and at right angles to the base A. An arm or pointer, F, is pivoted at or near the point O in the bar D, and passes over the arc E, and can be adjusted to and fastened at any required degree, minute, or second of elevation upon said arc that may be desired. Attached to the end or other suitable part of this arm F is a metallic point, *p*, either pivoted or otherwise. Through the center of the base A is affixed another metallic arc of a circle, G, which circle has also the point *o* for its center, and this arc G is on the same plane as the

the bar D, and is at right angles to the base A. This arc G is electrically insulated from the base A and from all other parts of the machine. To this arc G is attached a wire or conductor, H, running to one of the poles of an electric battery, and to any other part of the machine is attached another wire or conductor, H', running to the other pole of the battery. The point *p* is so adjusted that, in passing over the arc G, it touches it, and by so touching it closes the circuit of the electric current. In the circuit formed by these wires H H' is an electric fuse, used for firing the gun, or an electro-magnet is arranged to pull the trigger and release a hammer to explode the cap. Connected also with these wires and in this circuit is an ordinary telegraph-key, K, for opening and closing the circuit, preferably arranged so that the circuit is closed when the key is pressed down.

The method of operating my machine is as follows: The distance of the object to be fired at being determined, and consequently the required angle of elevation of the gun being known, the arm or pointer F is adjusted to and fastened at this angle as marked upon the arc; the gun is then pointed at the object, its barrel being parallel with the deck, and no attention is paid to its elevation or deflection (with reference to the horizon) by the rolling of the ship. When everything is ready for firing the officer in charge presses down the key K, and so soon thereafter as the gun attains the proper angle of elevation or deflection, by the rolling or other motion of the vessel, the point *p* passes over the arc G, and touches it, and thereby closes the circuit of the electricity, which passes to the fuse and ignites it, or to the electro-magnet and vitalizes it, as the case may be, thereby firing the gun. It will be evident that my machine need not be placed by the side of the gun, but may be affixed in any convenient position, the key only being required near the gun; also that one machine can be used, if desired, for any number of guns upon the same ship, requiring the same angle of elevation or deflection, and firing at the same object. Another method of operating my machine is to fasten the arm F to the arc E, so that the point *p* touches the arc G, and thereby closes the electric circuit when the "water-line" of the ship is parallel with the plane of the water; the gun is then elevated in the ordinary manner to the angle re-

quired to send the projectile to the object fired at. When all is ready for firing, the officer in charge presses down the key K, and so soon thereafter as the gun attains the required angle of elevation with the plane of the water, the electric circuit is completed by the point *p* coming in contact with the arc G, and the electricity passes to the fuse and ignites it, or to the electro-magnet and vitalizes it, as the case may be, thereby firing the gun. Another method of operating my machine is as follows: I place the machine upon the barrel of the gun and adjust the arm F upon the arc E at the required angle of elevation or deflection, as marked upon said arc; the gun is then elevated or deflected gradually, and so soon as it attains the proper angle with the plane of the water, (the key K being pressed down by the officer in charge,) the electric circuit is completed by the point *p* coming in contact with the arc G, and the electricity passes to the fuse and ignites it, or to the electro-magnet and vitalizes it, as the case may be, thereby firing the gun.

I do not confine myself to the particular form of mechanism I have described, as it is obvious that it can be modified and differently constructed without departing from the spirit of my invention; for instance, I can dispense with the ring C, pivoted to the standards B B', in which case the arc of metal G can be replaced by a point of metal with which the point *p* will form contact when the rolling, pitching or other motion of the vessel or gun brings the barrel of the gun to the proper angle of elevation or deflection. I can also employ other means than the contact of the point *p* with the metallic arc G, for the purpose of completing the electric circuit when the gun attains the required angle

of elevation or deflection; for instance, I can insulate points of metal in the bar D, or any part thereof, or in a metallic disk or its equivalent attached thereto in such manner that these insulated points come in contact with a metallic conductor of electricity, when by the rolling of the ship or otherwise the gun attains the proper angle of elevation or deflection with the plane of the water; or I can use a cup of mercury, into which a metallic arm dips when the gun attains the proper angle, as aforesaid. I can also use the armature of the electro-magnet to fire the cap, instead of employing it to release the hammer.

I disclaim the well-known electric fuse and all other familiar means for firing guns, torpedoes, mines, &c., by an electric current passing directly to the firing device; but I combine with such device, and in the same circuit, a mechanism whereby the fragments of an electric conductor are, by the gravity of a body free to move, brought together or separated, to close or open the circuit, and thereby fire the gun at the desired angle of elevation.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An electric circuit-breaking and closing apparatus, operated by gravity, combined with means for firing a gun, substantially in the manner and for the purposes specified.

2. The combination of the suspended weight or arc E and an adjustable electric conductor, F, with a stationary electric conductor, G, all arranged and operating substantially as described.

HENRY ARDEN.

Witnesses:

CHAS. E. EMERY,

W. H. WEIGHTMAN.