(No Model.)

2 Sheets—Sheet 1.

W. E. HICKS.

CENTRIFUGAL GUN.

No. 393,107. Patented Nov. 20, 1888.

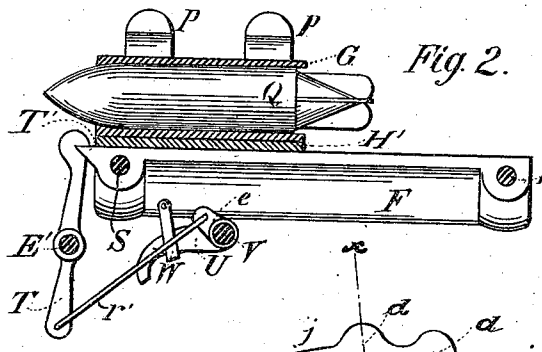

Fig. 2.

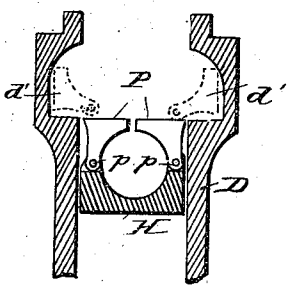

Fig. 6.

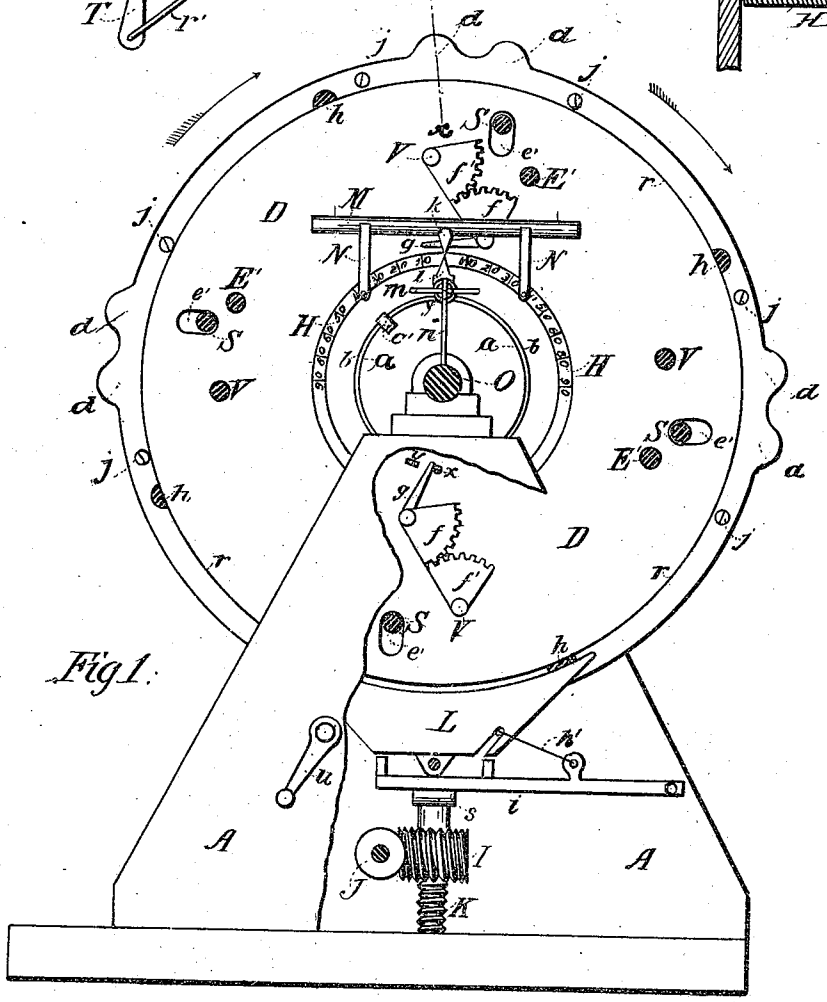

Fig. 1.

Witnesses.
W. B. Miner.
George E. Mills.

Inventor.
Walter E. Hicks.

(No Model.) 2 Sheets—Sheet 2.

W. E. HICKS.

CENTRIFUGAL GUN.

No. 393,107. Patented Nov. 20, 1888.

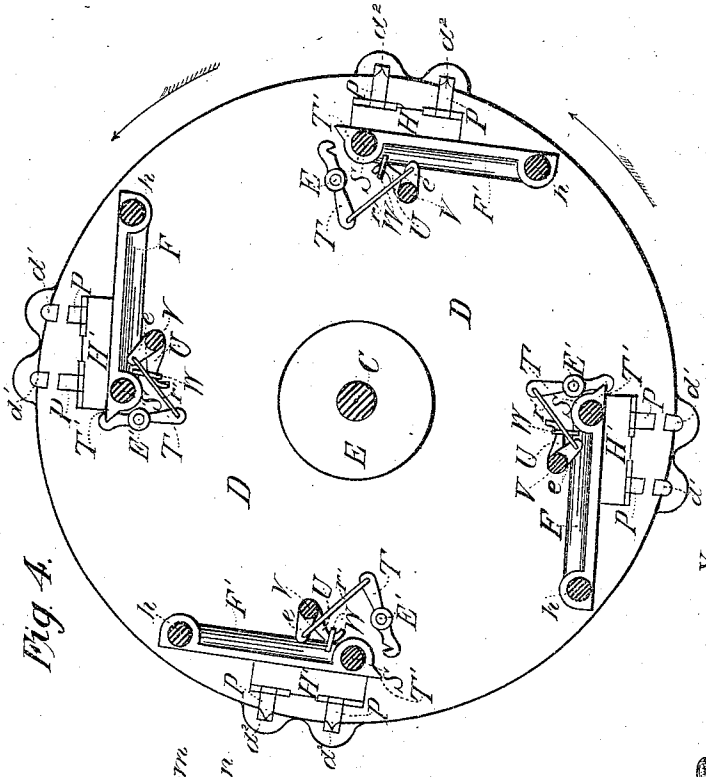

Fig. 4.

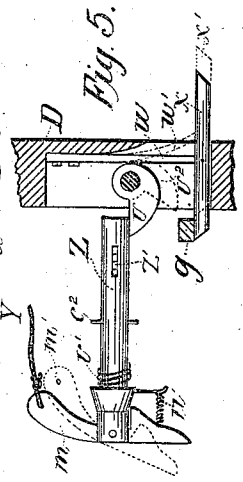

Fig. 5.

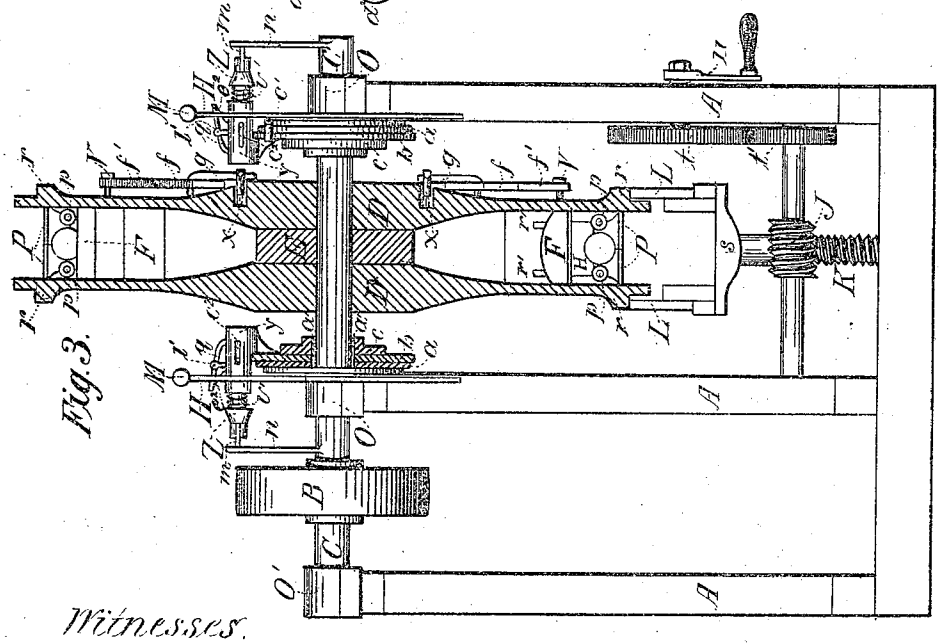

Fig. 3.

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UNITED STATES PATENT OFFICE.

WALTER E. HICKS, OF BROOKLYN, NEW YORK.

CENTRIFUGAL GUN.

SPECIFICATION forming part of Letters Patent No. 393,107, dated November 20, 1888.

Application filed September 8, 1887. Serial No. 249,100. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. HICKS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Centrifugal Dynamite-Guns, of which the following is a specification.

My invention has reference to centrifugal dynamite-guns; and it consists in providing the same with devices to maintain a solid shot, an explosive shell, or a combination shot and shell in position at or near the periphery of a pair of disk-wheels placed concentrically side by side until, power having been applied, the required velocity is obtained to throw or discharge the projectile the requisite distance desired, and the details of construction, all of which are fully set forth in the following specification, and shown in the accompanying drawings, which form part thereof.

The object of this invention is to throw or discharge a solid shot, an explosive shell, or a combination shot and shell, but principally an explosive shell charged with any of the modern high explosives—such as nitro-glycerine, nitro-gelatine, or gun-cotton—from the periphery or outward edge of the circle of a pair of rapidly-rotating disk-wheels by and through the action of the resultant of the central forces, centripetal and centrifugal, and I attain these objects by the mechanism herein illustrated and described.

Reference is to be had to the accompanying drawings, in which similar letters of reference indicate corresponding parts in all the figures. When a corresponding part is shown in a different position, the similar letters are primed.

The wheels revolve in the direction indicated by the arrows in the drawings, and the different parts are described with that direction in view.

Figure 1 is a side elevation with part of carriage broken away. Fig. 2 is an enlarged view of the firing-chambers. Fig. 3 is a rear elevation of the whole machine, part in section. Fig. 4 is a side elevation of the inside of one of the twin disk-wheels, showing the machinery within. Fig. 5 is an enlarged plan view of the cam, spring, lock-bolt, firing-bolt, and lever-arm, with a part of one disk-wheel in section. Fig. 6 is a detailed sectional view taken on the line *x x* of Fig. 1.

In Fig. 3, A represents a carriage to support the journals O' O O, through which the shaft C revolves. To this shaft is attached the pulley B, the division-wheel E, and the twin disk-wheels D D. The pulley B, having rotary motion imparted to it by any suitable agency, revolves the said wheels.

The twin disk-wheels, as shown in the drawings, Fig. 3, are bulged toward their centers, their sectional perimeters forming the curved lines of a tractory, with cusps cut off at the axis of motion and asymptotic to the periphery. They are made in this shape to resist the enormous strain of the centrifugal force, for to the velocity of the wheels is due the acceleration imparted to the projectile. Near the periphery of the said twin disk-wheels are four oblong firing-chambers, F F and F' F', Fig. 4.

It is to be understood that two of the firing-chambers, F and F, diametrically opposite to each other, are to be unlocked in rapid sequence from the right-hand side of the twin disk-wheels D D, while the two chambers F' and F' have been unlocked from the left-hand side of the said disk-wheels. All four of the firing-chambers can be unlocked simultaneously, or two of them can be reserved, if desired; but two of them must be unlocked from opposite sides of the wheels at the same time in order to maintain the stability of the equilibrium of the revolving wheels. At one end the said firing-chambers are journaled in the disk-wheels and rock on trunnions *h*. The other ends have axles S, oscillating in radial slots *e'*, Fig. 1, the oblong bar between the trunnions *h* and axles S being T shape, with concave sides trending to a flattened point at the bottom, so the arms *e* can work freely beneath, and to give strength to withstand the blow at the moment of discharge. On top at the axle ends of the said chambers are the cylindrical ungulas H', having hollow apertures shaped to fit one-half of the projectile Q. It is lined with rubber, canvas, flannel, G, or other pliable material to diminish the percussion when firing, as well as to protect the gunner when loading the gun. Attached to the said cylindrical ungulas are four doors, P, working on hinges *p*. These doors have lugs, which press tight against the sides of the twin disk-wheels and clasp the projectile in a vise-like grip when in the position shown by chambers F F in Fig. 4.

The said chambers are held in the said positions by clutch-bars T, working on shafts E', the notched ends meshing with clutch-teeth T', the other ends of the said clutch-bars being connected to shafts V by rods r' and arms e. When the projectile is to be discharged, the shaft V is turned by means to be hereinafter described, which unclasps the clutch-bars T from the clutch-teeth T', and the chambers F F are thrown upward by centrifugal force and cam U to the position shown by chambers F' F', the doors P falling automatically into pockets d' d', as shown by d^2 d^2. The projectiles at this instant having received their acceleration from the velocity of the twin disk-wheels, are released for their lines of flight, and the action of the firing-chambers flying upward at the moment of discharge counteracts the centripetal tendency of the curvilinear trajectory. Links W, attached to chambers F F and F' F' and linked to cams U, draw the said chambers down when locking.

The journals O O, Fig. 3, have circular flanges a a, with cylindrical sleeves a' a' extending on the inside, the opening of which is somewhat large, so as not to touch the shaft C beyond the proper bearings. On the ends of the said sleeves are the collars and flanges c c, (set by set-screws,) and between the said collars and flanges and the said journal-flanges the disks b b are placed concentrically face to face, revolving on the said sleeves. The said concentric disks are fastened by caps and thumb-screws c', attached thereto. The said caps slide on the periphery of the journal-flanges a a, and by the adjustment of the said concentric disks, so the pointers l will indicate on the annular rims H H the degrees of elevation or depression desired, and, fastening them there by the caps and thumb-screws c', the gun can be discharged at any given angle in the vertical plane.

y y are sleeves attached to the periphery of the concentric disks b b. Loosely sliding in the said sleeves are the firing-bolts Z Z, which are held in place by the cross-pins c^2 c^2, working in slots in the sides of the said sleeves. On top of the said sleeves are the pawls q q, whose fulcrums work in brackets l' l', attached to the sleeves. Beneath one end of the said pawls are springs e^2 e^2, pressing upward, so the other ends sink down through holes in the sleeves to catch in notches Z' in the firing-bolts Z Z when the said firing-bolts are driven forward. Attached to the shaft C are the firing-bars n n, which revolve with the said shaft.

Now, when the gun is to be fired, the gunner draws the lanyard Y, Fig. 5, which places the lever-arm m in the position m'. The said lever-arm is then struck by one of the firing-bars n, which drives the firing-bolt Z forward through the sleeve y. The firing-bolt Z then strikes the cam v, driving it to v^2. (Dotted lines.) The cam v, resting on spring w, attached to lock-bolt x, drives the said spring and lock-bolt to the positions w' and x'. (Dotted lines shown in the drawings, Fig. 5.) The firing-bolt Z next strikes the arm g, throwing the said arm and the sectors f and f' of the upper or first order to the position shown in Fig. 1. Sectors f and f' having now partly revolved shaft V, the arms e, by means of connecting-bars r', have unlocked clutch-bars T from clutch-teeth T', and the cam V has raised the firing-chambers F' F', as shown in Fig. 4. Detent-pawl q having caught in the notches Z' in the firing-bolt Z when the said firing-bolt was driven forward in the first order, retains the said firing-bolt till the cam U, arm g, and lock-bolt x of the lower or second order, on the opposite side of the same wheel, arrives, (Fig. 1,) when a like action, as described above, produces like results. When the wheels have been stopped, the gunner presses the spring end of the pawl q down, when retract-spring u' returns the firing-bolt Z to its proper place. Retract-spring v' returns the lever-arm m when the lanyard Y is released.

H H, Figs. 1 and 3, are annular rims attached to the carriage A. They encircle the concentric disks b b and are graduated with the degrees of two quadrants. Sliding on the said annular rims are two standards, N N, (set by set-screws,) which support the sight-tubes M M. The said sight-tubes are provided with magnifying-lenses inside and pin-sights on top. At the center of the said sight-tubes are pointers k, pointing to the degrees on the annular rims H H. On top of the sleeves y y are also pointers l, pointing to the degrees on the said annular rims, so the gunner can sight the object, compute the degrees required, and set the pointers to correspond on the index, then discharge the gun.

The annular rims r r near the outward edge of the twin disk-wheels, Figs. 1 and 3, are on the line where the doors P effect their greatest strain. They are placed there as braces and utilized as brake-wheels, to which are applied the brake-shoes L L. When the twin disk-wheels are in motion and it is desired to stop them, the crank u is turned, which rotates the spur-wheel t. The said spur revolves the pinion t', the said pinion rotates the worm J, the said worm revolves the worm-gear I and the jack-screw K, raising the frame i and the fulcrum s, on which the brake-shoes rest. h' is a brace-bar to steady the brake-shoes L L.

In Fig. 1, d d d d d d are the outside of the pockets into which the doors P fall. j j j j j j are assembling-bolts. h h h h are the ends of the trunnions of the four firing-chambers. S S S S are the ends of the axles on the other end of the said firing-chambers which oscillate in the radial slots e' e' e' e'. V V V V are the ends of the shafts, having the arms e and cams U attached thereto. E' E' E' are the ends of the shafts on which the clutch-bars T work.

In Fig. 3, r' r' are two bars on the bottom of one of the firing-chambers.

In Fig. 2, Q is a projectile lying in position, the doors P thrown open as at the moment of release.

I do not limit myself to the details of con-

struction, as they may be modified in various ways without departing from my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a centrifugal gun, the shaft C, pulley B for revolving the same, and the twin disks D D, secured upon the said shaft a short distance apart, in combination with oppositely-arranged projectile-carriers pivoted at *h* to and between the twin disks, the hinged doors P P for locking the projectile in the carriages, recesses *d' d'*, formed in the twin disks, retaining devices for holding the free ends of the projectile-carriers, and means for disengaging the retaining devices from the projectile-carriers, substantially as described.

2. The disks D D, secured a short distance apart upon the shaft B and made tapering from the center to the periphery and formed with opposite recesses, *d' d'*, in combination with oppositely-arranged projectile-carriers H, hinged at one end to and between the said disks, the doors P P, hinged to the said carriers in position to swing back into the said recesses *d' d'* at the time of firing to release the projectile, substantially as described.

3. The twin disks D D, placed centrically side by side upon a shaft, C, the pulley B for revolving said shaft, the journals O O for said shaft having circular flanges *a a*, with cylindrical sleeves *a'*, extending on the inside, the said sleeves acting as a shaft for the concentric disks *b b* to revolve upon, the pivoted projectile-carriages, and the clutches T, in combination with intermediate mechanism for operating the clutches for releasing the projectile-carriages, substantially as described.

In testimony of which invention I hereunto set my hand in the presence of two witnesses.

WALTER E. HICKS.

Witnesses:

W. S. BIGBY,

JOHN POWELL.