

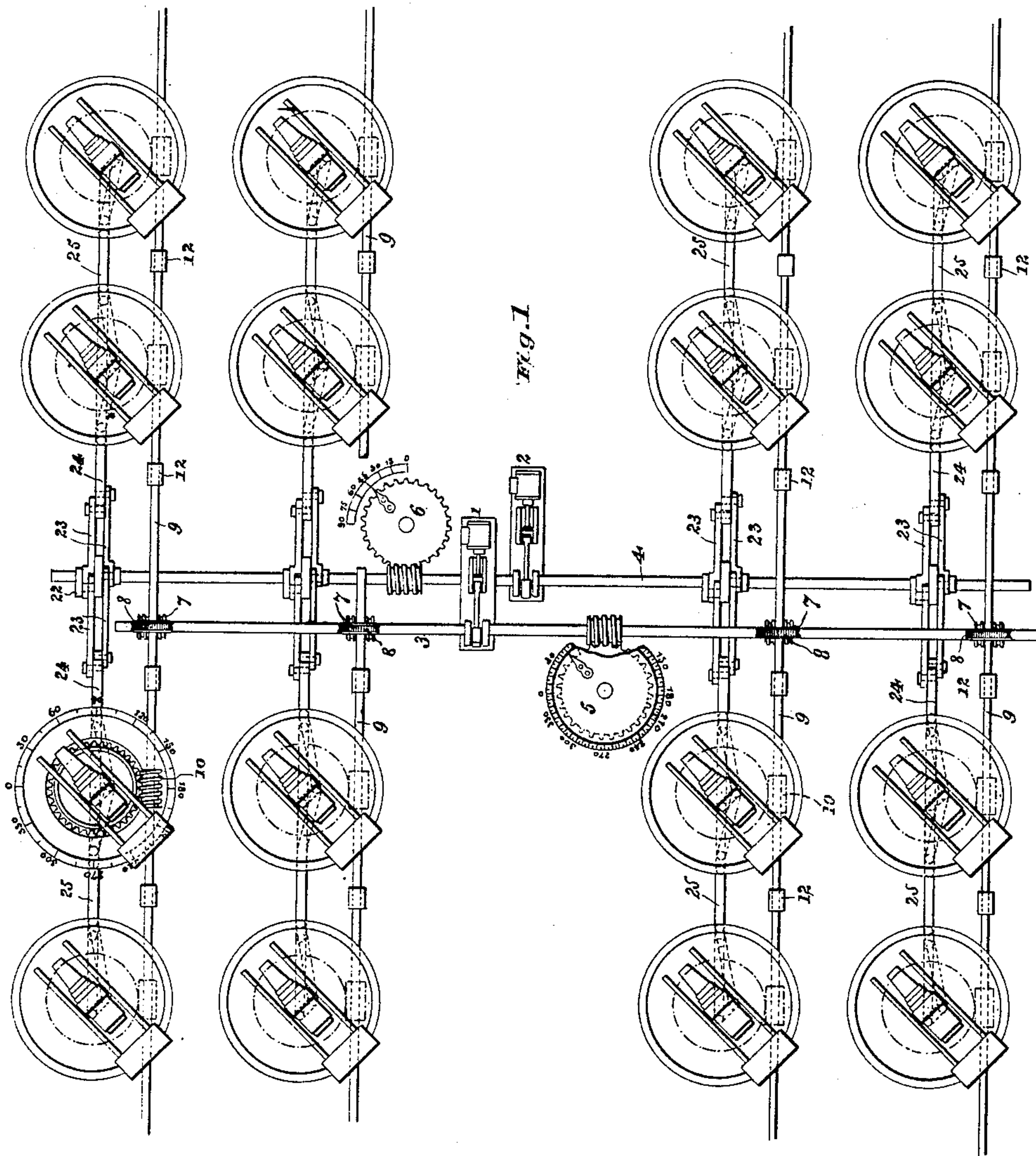
(No Model.)

4 Sheets—Sheet 1.

S. P. HATFIELD.
ORDNANCE BATTERY.

No. 451,004.

Patented Apr. 21, 1891.



Witnesses.
Raphael Netter
Ernest Hopkinson

Inventor
Saul P. Hatfield
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Attorneys

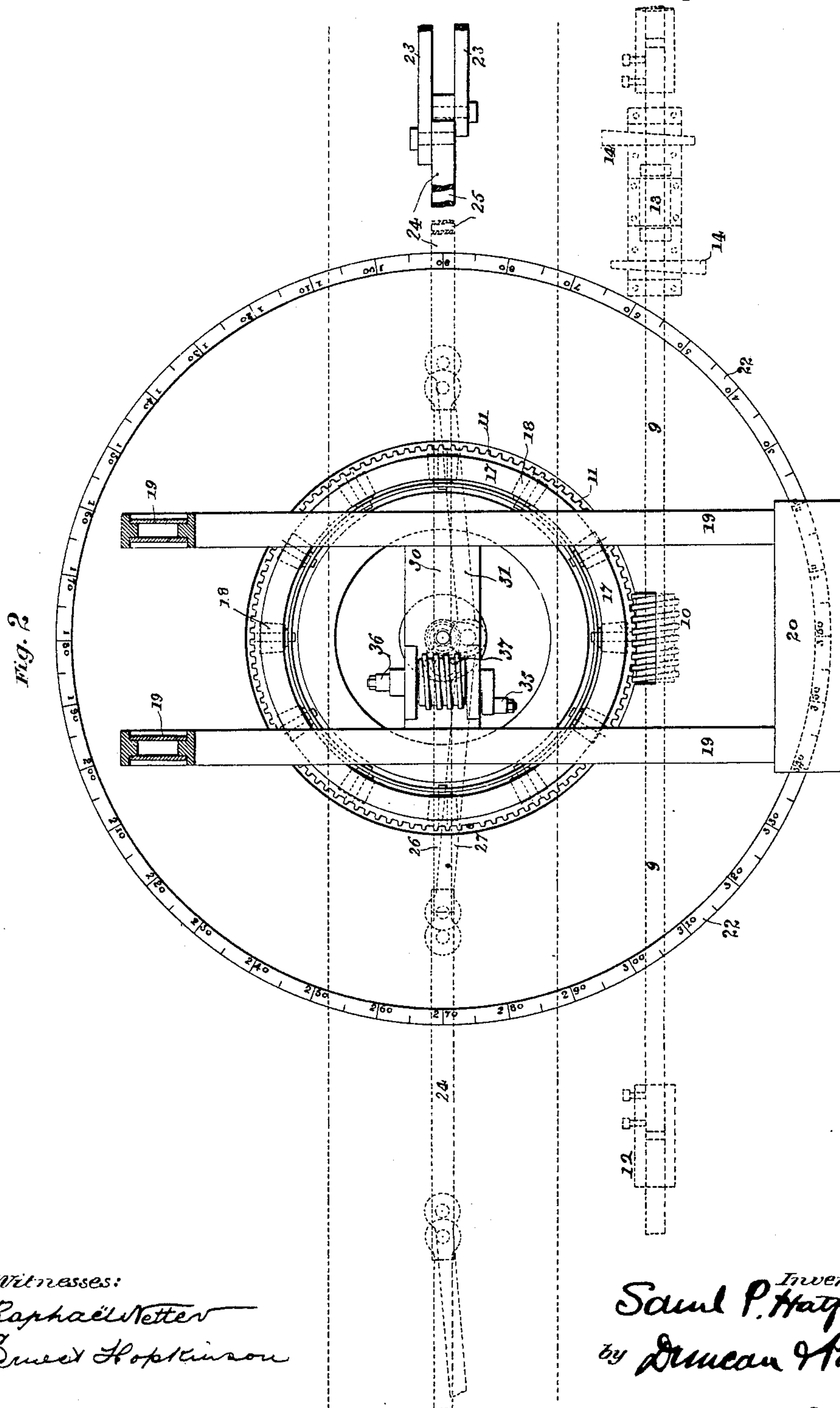
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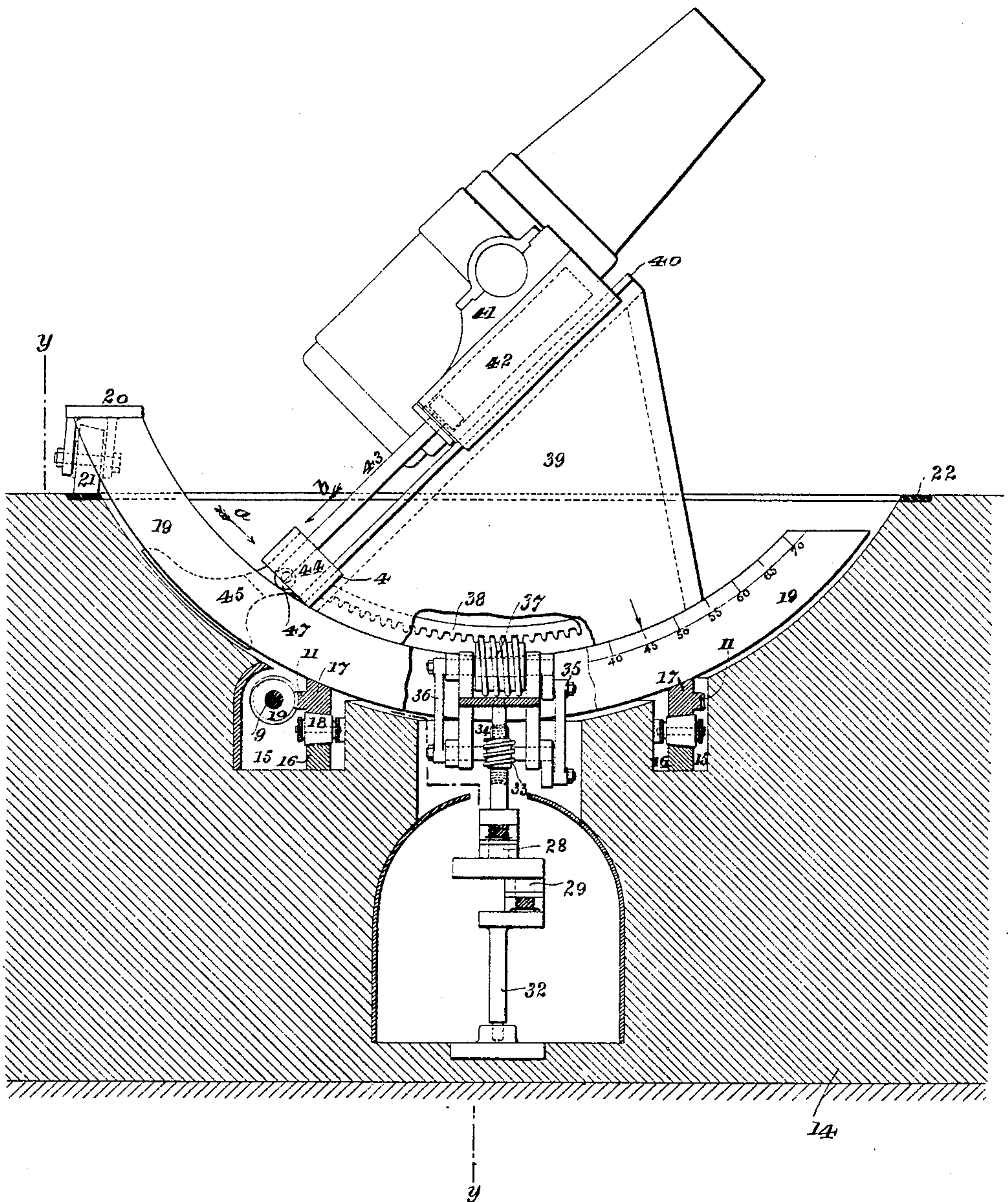
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Fig. 3



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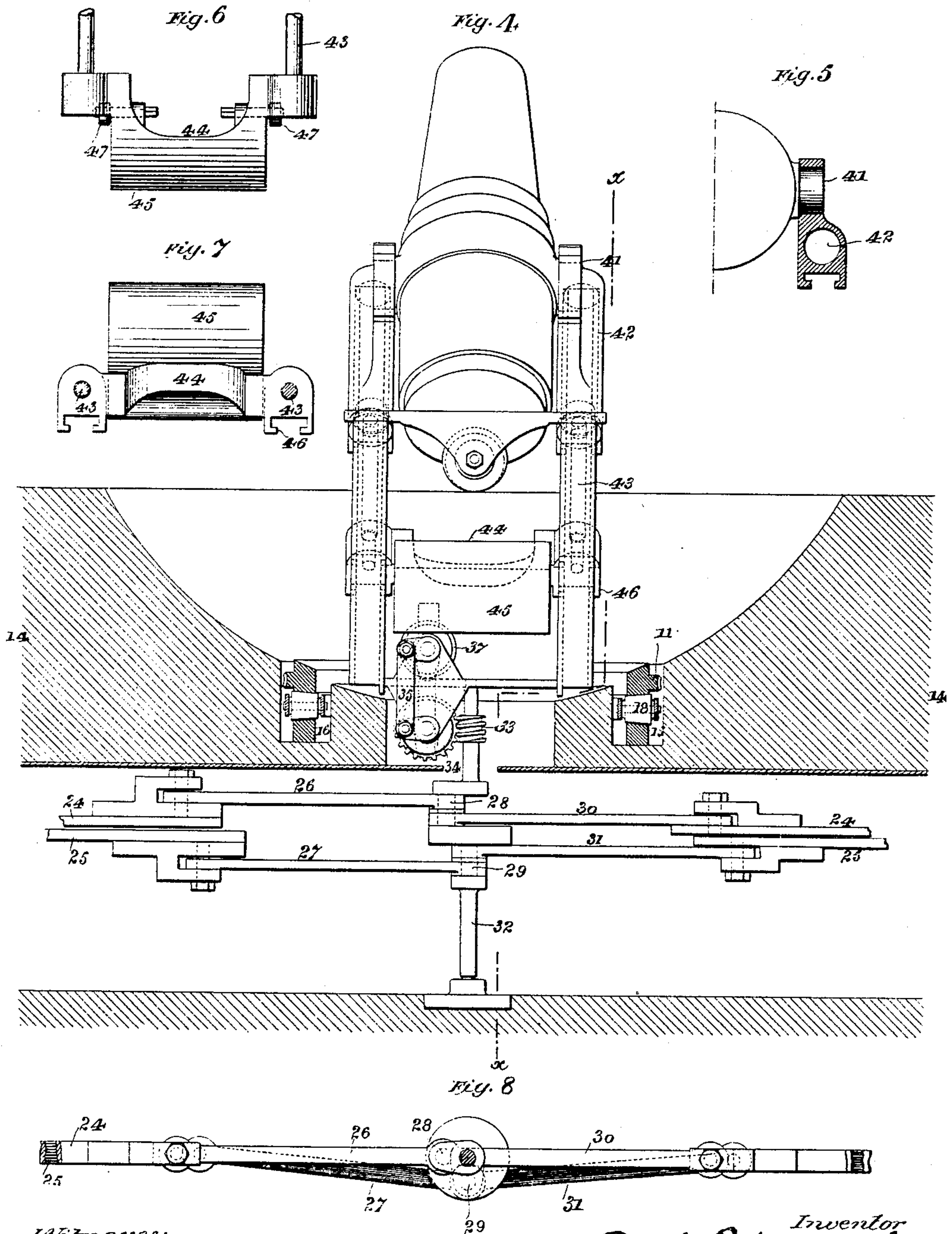
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UNITED STATES PATENT OFFICE.

SAMUEL P. HATFIELD, OF JAMAICA, NEW YORK, ASSIGNOR OF ONE-HALF
TO THE CONTINENTAL IRON WORKS, OF BROOKLYN, NEW YORK.

ORDNANCE-BATTERY.

SPECIFICATION forming part of Letters Patent No. 451,004, dated April 21, 1891.

Application filed August 28, 1890. Serial No. 363,250. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. HATFIELD, of Jamaica, in the county of Queens and State of New York, have invented certain new and
5 useful Improvements in Ordnance-Batteries, of which the following is a description, reference being had to the accompanying drawings.

The present invention has for its object to
10 provide means whereby the guns or mortars, particularly the latter, of a battery can be manipulated simultaneously so as to be trained upon an enemy's vessel or fleet and deliver a broadside or shower of projectiles or such
15 a number of projectiles as may be deemed necessary for the desired effect.

The invention consists, generally, of a group or line of guns or mortars, each having its elevating and traverse mechanism, such
20 mechanism being operated by power-connections common to all the guns or mortars, and these connections being controlled from a single operating-station.

The invention will be described as applied
25 to a group of mortars, though it is to be understood that other forms of guns may be employed, and the various special features of invention will be set forth in the claims to follow the description.

30 Referring to the drawings, Figure 1 is a general plan of a group or battery of sixteen mortar-guns arranged and operated in accordance with my invention. Fig. 2 shows a detail plan view of one of the mortar-pits and
35 the mechanism contained therein, the gun and carriage being removed. Fig. 3 is a central vertical section of the masonry of a mortar-pit and parts of the mechanism in the same, the section running with axes of the
40 guns, as seen in Fig. 1, and on plane xx of Fig. 4. Fig. 4 is a similar vertical section at right angles to the axes of the guns or on plane yy of Fig. 3. Fig. 5 is a cross-section of one of the recoil-cylinders. Fig. 6 is a plan
45 view of the gun-buffer looking in direction of arrow a , Fig. 3. Fig. 7 is an elevation view of the same looking in direction of arrow b , Fig. 3. Fig. 8 is a detail plan view of the connections between the bars that transmit
50 motion to elevate and depress the gun and the elevating mechanism at a gun.

Referring to these views in detail, and particularly to Fig. 1, 1 and 2 represent, respectively, what I shall designate as the "traverse" and "elevating" motors. These motors may be
55 any suitable source of power, such as steam or electricity. They operate the traverse and elevating shafts 3 and 4, to which shafts are connected appropriate indicators 5 and 6, arranged to show degrees of horizontal and ver-
60 tical movement. These shafts 3 and 4 proceed from a central station, where are located the motor or motors 1 and 2 or the controlling mechanism of some source of power, as well
65 as the indicators 5 and 6. This central station governs the whole battery, so far as concerns the aiming of the guns, and may also have control of the firing of them. The am-
70 munition is supposed to be properly located with reference to the various mortar-pits, and the usual means of loading and otherwise pre-
paring the mortars for discharge are assumed to be provided for each gun, all systematically controlled from the central station.

The particular arrangement of the mortar-
75 pits is not essential to the invention; but I have preferred to show a battery of sixteen mortars arranged in square and subdivided into groups of four, as best exhibiting the method of operating from a single station.
80 From this arrangement it will appear how the plant may consist of an arrangement of mortars in one or more straight lines or in various forms of groups.

On each side of the central station or posi-
85 tion of control the shafts 3 and 4 extend out and are connected with the mechanism located at each mortar-pit. I will first describe the traverse system. The shaft 3 carries screw-wheels 7, which mesh with the gears 8
90 on the side traverse-shafts 9. These shafts are also provided with screws 10, which mesh with gear-rings 11 on the turn-tables of the mortars. (See Fig. 2.) These side shafts 9
95 are provided at suitable intervals with couplings 12, by which the turn-tables can be adjusted relatively. These shafts are also supported against longitudinal thrust in bearings 13, which are arranged to be moved by
100 keys 14, by which means a fine adjustment of the whole of one of the shafts may be made relative to the turn-tables it operates.

Referring to Figs. 2 and 3, 14 is the masonry of a mortar-pit. The pit is bowl-shaped or concavo-spherical in general form. Just below this pit and in the sides thereof around its lower point is a circular channel 15, in which is a suitable track 16. Upon this track runs the annular turn-table 17, there being interposed the usual friction-wheels 18. Upon the turn-table is supported the chassis 19, which is composed of two compound angle-bar segments, Fig. 2, and extends at one end a little above the mouth of the pit, where the two bars or side frames are joined by a cross-bar 20, carrying a roll 21, Fig. 3, that bears upon the track 22, graduated to indicate the degrees of horizontal movement of the mortar. It will now be seen that with the mortars all similarly adjusted to the side traverse-shafts—that is, the chassis brought into parallel—if the motor 1 be started power will be transmitted to all the mortar-tables to rotate them equally in horizontal planes to any extent that may be required to bring all the mortars to bear, except for the extent of their separation upon the same object. Of course, if desired, the separate mortars may be differently adjusted relative to the side traverse-shafts, so as to cause them to converge upon one object or to diverge so as to cover a given area larger than the area of the battery-plant.

I will now describe the mechanism for vertically moving the mortars, by which they are all brought to the desired inclination. Motor 2, Fig. 1, is connected to and revolves the mortar elevating and depressing shaft 4. At places in this shaft opposite the lines of mortar-pits are crank 22^a, to which are attached the crank-rods 23, also connecting with the bars 24 and 25, sliding upon each other on proper supports, which bars extend to and operate the elevating mechanisms of the mortars. Figs. 3, 4, and 8 illustrate this mechanism and its connections to the bars 24 and 25. At each gun-pit one section of the bars 24 and 25 ends, respectively, in the crank-rods 26 and 27, which are upon the same crank-wrists 28 and 29 as the crank-rods 30 and 31, connected to the next length or section of the sliding bars, which section continues to the next gun-pit in the line. The cranks 28 and 29 are set at ninety degrees apart, and are in the vertical shaft 32, bearing the screw 33. This arrangement of cranks and crank-rods is also used where the main gun-elevating shaft 4 attaches by arms 23 to the sliding bars 24 and 25, and hence is not fully shown as thus applied.

Fig. 8 may be considered as a plan of the crank-rod connections of Fig. 4, or as an elevation of the crank-rod connections between the shaft 4 and bars 24 and 25. The object of this arrangement is to avoid dead-centers, as it will be manifest that as shaft 32 is revolved from shaft 4 and one crank-arm approaches its dead-center point the other crank-arm will be passing through its right-angle phase, and will therefore serve to insure the carrying of the first arm by its dead-center

point, and thus preserve the regular rotation of all the shafts of the system. This permits the use of shafts, cranks, and sliding bars throughout the system and obviates the lost motion that necessarily would result were gearing or belts used to transmit the regulating motions to the separately-placed mortars.

Upon the chassis of each mortar is supported gear 34, meshing with screw 33 and operating, through crank-rods 35 and 36, the screw 37, which screw meshes with the segmental rack 38, carried on the gun-carriage 39, the carriage being in any suitable way movably confined to the upper surface of the chassis-frame 19. The arrangement of the crank-rods 35 and 36 is the same as that on the main-shaft rods 23 and that of the rods 26 and 27 of slides 24 and 25, and the motion is similarly transmitted. It will now be seen that operating the shaft 4 causes each of the mortars to be elevated or depressed, and each to the same extent as any one or all of the others. The mortars may be all set to the same angle of elevation and so maintained, or they may be set to different degrees of inclination to concentrate their fire or to cover an extended area of attack.

The means of mounting the mortars upon their carriages and taking up their recoil is in general similar to mechanism already proposed—that is to say, between the gun and a recoil-abutment consisting of the walls of the gun-pit or other ground-work is arranged a recoil-cylinder and piston adapted to take the initial pressure of recoil and as such pressure increases to transmit it to the pit-masonry, and thus relieve the gun carriage and chassis of shock and consequent wear and tear. I have adapted these means to the present mortar-supports with some improvements that I will now describe, and which are essential to the successful operation of a segmental chassis in a concavo-spherical pit such as I have described—that is to say, in order to have full control of a battery of mortars and to accurately and quickly adjust them it is requisite that the supporting parts of each mortar be as light as practicable, and to secure this lightness of structure the mortar-supports should not have to sustain at most but a small portion of the effects of recoil. As already described, each mortar-pit is concavo-spherical in form, and the axis of the traverse-table is concentric with the axis of such concavity, so that all the motions of the chassis and turn-table are in effect parallel to the surface of the pit—a condition also greatly assisting the regular and accurate adjustment of the parts of the system. The mortar-carriage 39 is provided with ways 40, upon which slide the mortar-trunnions 41, these trunnions having formed in or attached to them the cylinders 42, which are adapted to hold a suitable fluid controlled by any of the well-known means, whereby it serves to cushion the shock of discharge. The piston-rods of these cylinders are represented at 43.

They are joined by the cross-head 44, also provided with the buffer 45 and feet 46 for engagement with the carriage-slide 40. The buffer has a curved and extended face, Figs. 3, 6, and 7, corresponding to the curve of the pit, and normally is close to the pit-surface, being also located between the sides of the chassis-frame and in direct line with the mortar. Two eccentric rollers or cams 47, Figs. 3 and 6, are supported in the cross-head 44 and bear upon the upper faces of the chassis-frame. Their office is to adjust the buffer relatively to the walls of the pit. When desired, the cams may be turned to let the buffer rest firmly upon the masonry, as at the time of a series of discharges at one horizontal position or azimuth angle, or the cam may be set so as to hold the buffer clear of the masonry, except at the moment of firing, when a slight and permissible yielding of the chassis will bring the buffer and masonry in contact, as in case when the azimuth angle is often changed and it is desirable to the free movement of the turn-table to have the buffer off the face of the pit.

The various mortar-pits may be protected by other earth or masonry works than that shown in the drawings, and it will be manifest that the system of shafting and slide-bars will ordinarily be arranged in tunnels or chambers, as shown in Figs. 3 and 4. I have spoken of the gun or mortar pits as being built of masonry; but they may be metal-faced or otherwise constructed in accordance with the principles of fortification-building. By these means a battery of mortars can be operated mechanically, and hence more accurately than when the guns are each manned and operated by different agencies. A shower or broadside of projectiles can be hurled at an enemy to accurately cover any area, and necessary variations can be calculated and made with a precision not possible where the element of individual error is possible at each gun. The factors of judgment and observation can be concentrated at the central station, where also is indicated the exact condition of the guns, and the battery as a whole managed to produce the greatest effects.

What is claimed as new is—

1. In combination with an ordnance-battery composed of a series of guns or mortars, traversing mechanism located at each of the guns, mechanical connections common to all of said traversing mechanisms, and a motor attached to and for operating said connections, whereby all the guns of the system can be simultaneously traversed.

2. In combination with a battery of ordnance composed of a series of guns or mortars, elevating and depressing mechanism located at each of the guns, mechanical connections common to all of said elevating and depressing mechanisms, and a motor attached to and for operating said connections, where-

by all the guns of the system can be simultaneously elevated or depressed.

3. In combination, in a battery of ordnance, a series of guns each provided with elevating and traversing mechanism and machinery connecting a motor with said traversing and with said elevating mechanisms and adapted to simultaneously operate the same.

4. In combination, a mortar-pit of concavo-spherical form, a mortar-gun, carriage and chassis supported in the pit and traversing around the axis of the same, and a recoil-buffer to the mortar carried on the chassis, whereby whatever be the position of the mortar the recoil of the same is transferred to the walls of the pit.

5. In combination, a mortar-pit of concavo-spherical form, a segmental chassis centrally supported in the same, a segmental mortar-carriage adjustably supported upon said chassis, a mortar-gun sliding upon said carriage, and a buffer connected to the trunnions of the gun and adapted to deliver the shock of recoil to the walls of the pit.

6. In combination, a shaft 3, connected to and driven by a motor and bearing screws 7, one or more traverse-shafts 9, geared to said screws and bearing the screws 10, and the turn-tables 17 of a series of independently-located mortars connected by gears to said screws 10, substantially as and for the purpose described.

7. In combination, the motor and its motor-shaft 4, the sliding bars 24 and 25, connected by crank-rods 23 to said shaft and by crank-rods 26 27 to the vertical shafts 32, and the screw and gear connections 33 and 37 of a series of mortar chassis and carriages, substantially as and for the purpose described.

8. In combination, a mortar-pit 14, of concavo-spherical form, the turn-table 17, concentric to the axis of the pit, the segmental chassis 19 and gun-carriage 39, the carriage-rack 38, and the screw 37 for moving the said carriage on the chassis to give elevation or depression to the mortar, and mechanism for operating the same, substantially as and for the purpose set forth.

9. The concavo-spherical pit 14, the segmental chassis 19 and turn-table 17, the gun-carriage 39, having ways 40, the gun-trunnions 41, carrying cylinders 42, and the buffers 45, attached to the piston-rods of said cylinders and adapted to transfer the shock of recoil to the walls of the pit.

10. In combination with the chassis and gun-carriage, the recoil-cylinders 42, and piston-rods 43, the cross-head 44, carrying the buffer 45, and a cam 47, adapted to adjust the buffer relatively to the face of the pit-wall, as and for the purpose described.

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