(No Model.)

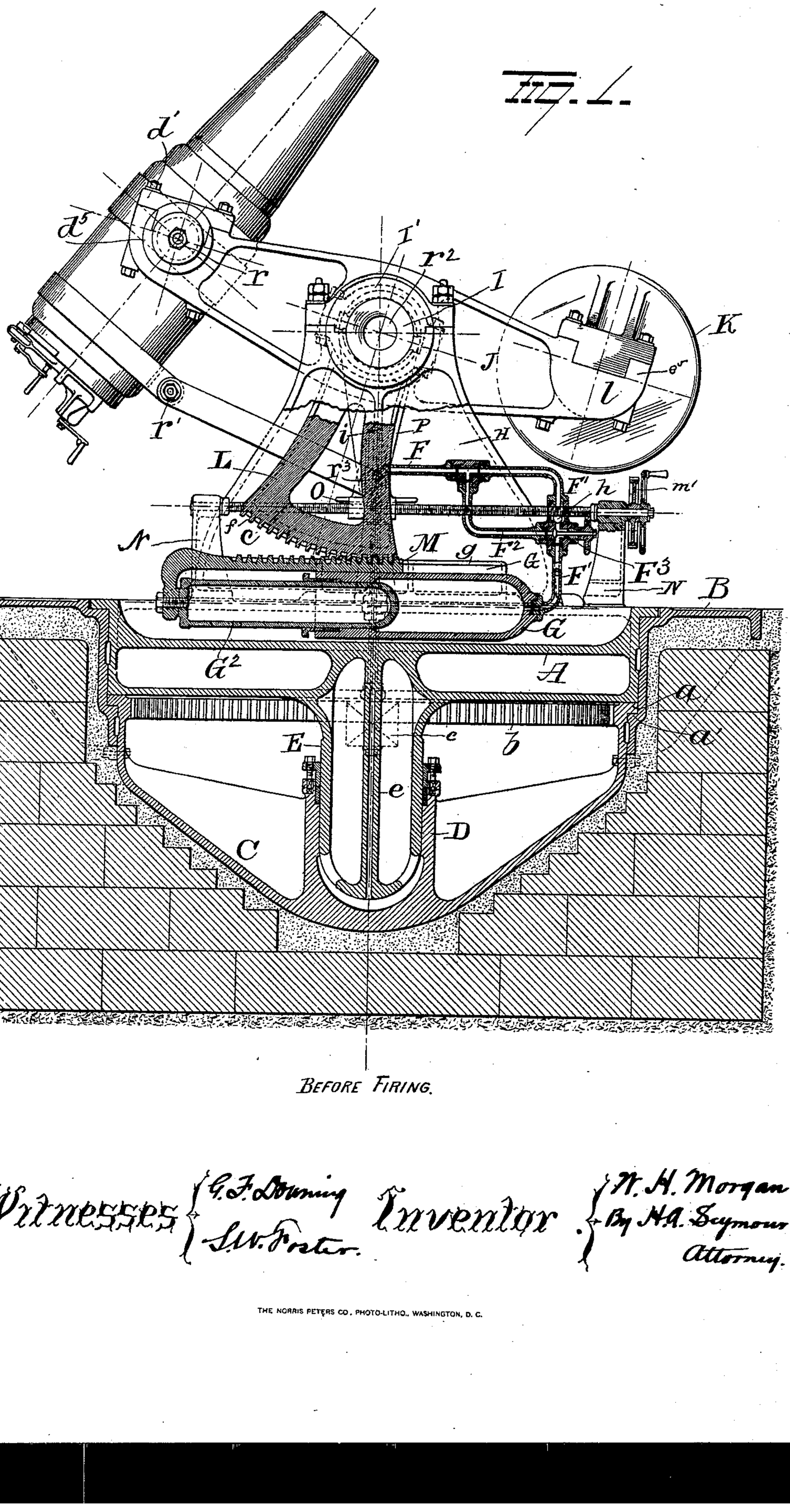
3 Sheets—Sheet 1.

W. H. MORGAN.

MORTAR MOUNTING.

No. 582,661. Patented May 18, 1897.

Fig. 1.



BEFORE FIRING.

Witnesses { G. F. Downing, L. W. Foster. }

Inventor { W. H. Morgan, By N. A. Seymour, Attorney. }

(No Model.)

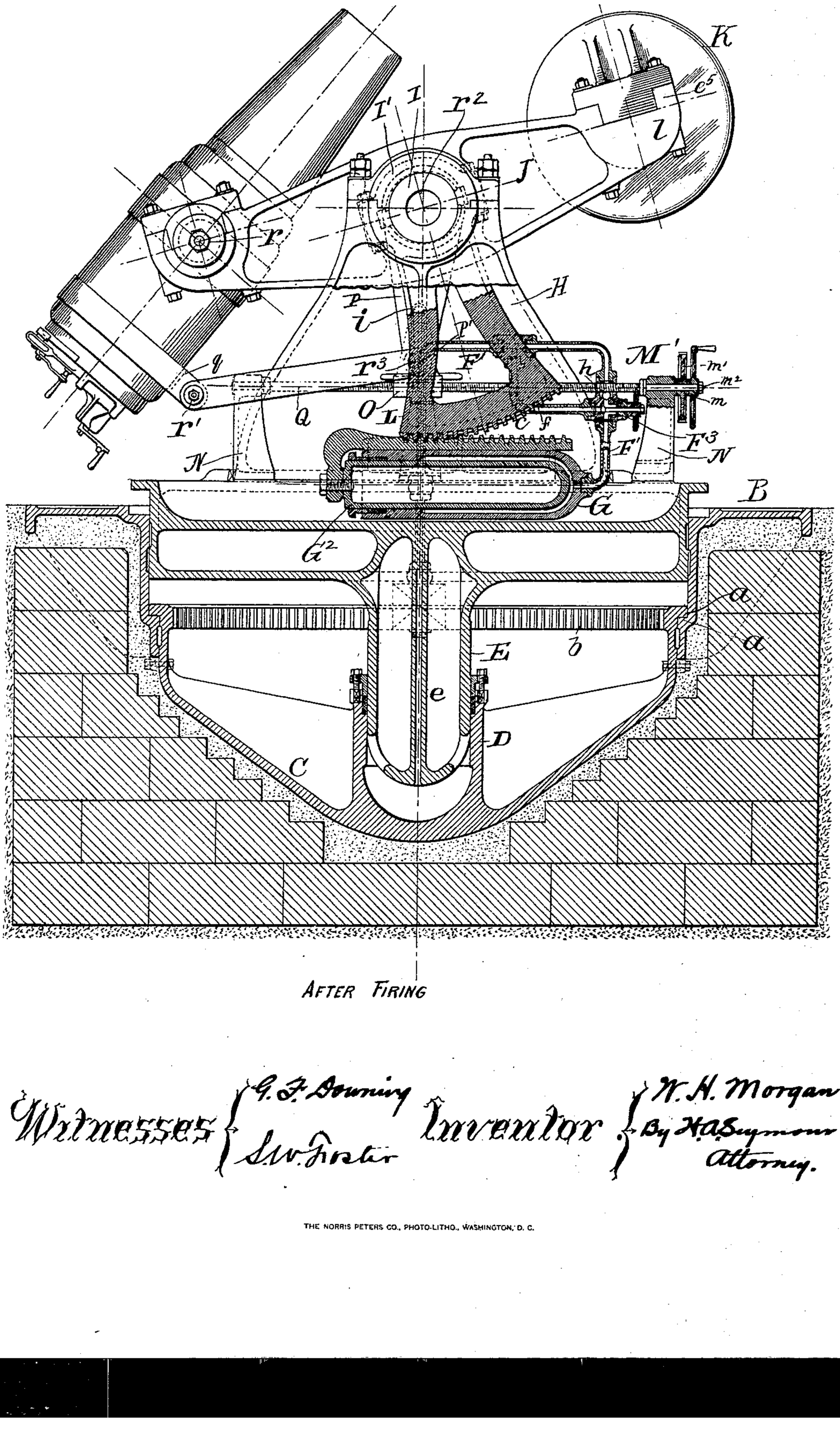
3 Sheets—Sheet 2.

W. H. MORGAN.

MORTAR MOUNTING.

No. 582,661. Patented May 18, 1897.

Fig. 2.



Witnesses { G. F. Downing, L. W. Foster

Inventor { W. H. Morgan, By H. A. Seymour, Attorney.

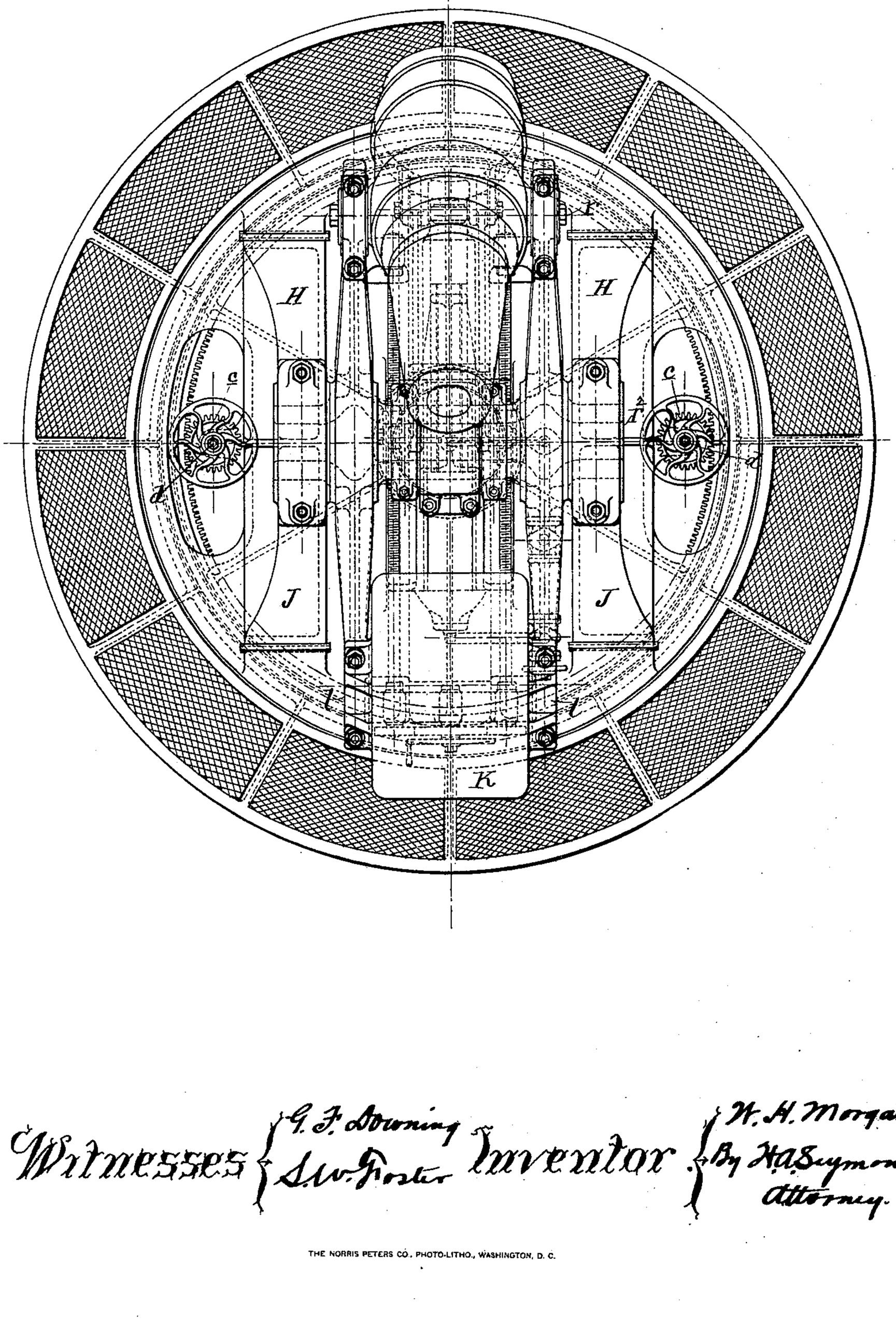
(No Model.) 3 Sheets—Sheet 3.

W. H. MORGAN.

MORTAR MOUNTING.

No. 582,661. Patented May 18, 1897.

Fig. 3.



Witnesses { G. F. Downing, S. W. Foster } Inventor { W. H. Morgan, By H. A. Seymour, Attorney. }

UNITED STATES PATENT OFFICE.

WILLIAM H. MORGAN, OF ALLIANCE, OHIO.

MORTAR-MOUNTING.

SPECIFICATION forming part of Letters Patent No. 582,661, dated May 18, 1897.

Application filed March 23, 1894. Serial No. 504,859. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Mortar-Mountings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in mortar-mountings; and it consists in a mortar mounted on walking-beams, the latter carrying a counterweight at their outer ends and hydraulic devices actuated by the movement of the walking-beam, whereby the carriage is elevated by the recoil and the force of energy of recoil stored for restoring the mortar to its firing position.

My invention further consists in certain details in construction and combinations of parts, as will be more fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, partly in side elevation and partly in section, showing the mortar in position for firing. Fig. 2 is a similar view showing the position of parts after firing, and Fig. 3 is a plan view.

A represents a carriage normally resting on the casting B and on the upper edge of the saucer-shaped casting C, which latter is flanged at its upper edge, as at *a*, so as to rest on shoulder *a'*, formed near the lower edge of casting B. The part C is provided near its upper edge with the teeth *b*, constituting in effect a circular rack with which the elongated pinions *c* on shafts *d* mesh for traversing the carriage, and is also provided centrally with the cylinder D, in which the hollow plunger E, integral with or secured to the under side of the carriage A, rests and moves. This plunger E has openings in its lower end for the free entrance of the fluid used for elevating the carriage, while the upper part thereof is closed, forming an air-chamber. Passing vertically through the plunger E is a conduit *e*, formed integral with the plunger or secured thereto and connected at its upper end with the pipe F, leading to the cylinder G. The hydraulic mechanism above referred to will be more fully described later on.

The carriage A is circular in shape and carries the side frames H, which latter are provided at their upper ends with half-bearings in which the axle I rests, the half-bearings being closed by the caps I'. To this axle are rigidly secured the parallel walking-beams J, both beams J being provided at one end with half-bearings d^5 for the trunnions of the mortar and with caps *d'* for closing the half-bearings and at the opposite end with bearings e^5 for the weight K, which latter counterbalances the mortar. Instead of employing two beams connected together a single bifurcated beam may be used. By this arrangement of parts it will be seen that when the mortar is in its elevated position or in position for firing the counterweight is in its depressed position, and hence under the recoil when the mortar is forcibly depressed by the energy of recoil the counterweight is elevated, thus partly absorbing the shock.

To assist the counterweight in absorbing the shock and also to elevate the carriage so that it can be readily turned, as in traversing, I have connected the hydraulic devices above referred to with the axle by means of the segment L. This segment L is fast to the axle or to the beam, and hence when the axle is turned by the movement of the beams the segment is also moved in the arc of a circle concentric with the axle. The lower end of this segment is concentric with the axis of the axle and is provided with teeth *f*, which latter engage the longitudinally-sliding cross-head M, located above cylinder G and guided by the ways G'. This cross-head is extended downwardly at its rear end and is connected at its lower end to the rear or outer end of plunger G^2, which latter moves in cylinder G.

As before stated, the conduit *e* in plunger D communicates with pipe F. This pipe F is coupled to pipe F', which leads to cylinder G, and is provided at *h* with a ball or other valve, which permits of the free passage of the fluid from cylinder G to pipe F and from thence to cylinder D through conduit *e*. Pipe F is also connected to pipe F' below valve *h* by a by-pass F^2, which can be closed by the valve F^3.

When the mortar is in position for firing, as in Fig. 1, the valve F^3 is closed, the plunger E is in cylinder D, and plunger G^2 withdrawn from cylinder G, the cylinder G being

full of the fluid employed, while cylinder D is practically empty. Upon the recoil of the mortar the segment is moved to the right, carrying with it the cross-head M and plunger G^2. The plunger G^2 forces the fluid from cylinder G through pipes F′ and F and conduit *e* into cylinder D under the plunger and, acting on the air-cushion in the hollow plunger, gradually elevates the plunger and the carriage until the carriage and parts carried thereby are supported by the plunger E, resting on the liquid in cylinder D, which forms a hydraulic pivot on which the carriage and parts thereon can be easily turned.

From the foregoing it will be seen that the instant the fluid is forced from the upper cylinder on the carriage into the lower cylinder the fluid first forced into the lower cylinder operates to compress the air in the air-chamber formed in plunger E and thus give time for the carriage to recover from the shock. After the air has been compressed to its limit the fluid then entering naturally elevates the carriage, but the movement is gradual in comparison to what it would be were the air-cushion dispensed with.

To restore the carriage to its normal position, as shown in Fig. 1, valve F is opened and the fluid is forced by the weight of the carriage and parts thereon and the expansion of the air in the lower cylinder up through conduit *e*, pipe F, by-pass F^2 to pipe F′, and from thence into cylinder G, thus turning the walking-beams, with the mortar and weight thereon, from the position shown in Fig. 2, which discloses the position of the parts immediately after recoil, to the position shown in Fig. 1.

To hold the mortar in proper angle for firing and to cause it to move parallel to the angle of firing during the recoil, I have provided the following mechanism:

N are four uprights secured to the carriage A between the side frames, the said uprights being arranged in pairs, the upright of each pair being located near the ends of the side frames.

Journaled in the uprights N are the screws M′, each of which is provided with a pinion *m*, meshing with the larger pinion *m′* on shaft m^2. This shaft m^2 carries a hand-wheel. Hence it will be seen that by turning shaft m^2 both screws are revolved. Mounted on each screw is a block O, screw-threaded internally and provided with an upward projection having an elongated slot *i* therein. The two blocks O are located diametrically opposite each other, and as the screws move together it follows that the blocks are moved in unison lengthwise the screws.

Loosely depending from the axle I are two arms P, each of which carries a wrist-pin P′, passing through the slot *i* of its respective block O.

The screws M′ are located on opposite sides of the segment L, and the two blocks O thereon are connected, through the wrist-pins P′, with the bars Q, the opposite ends of which are secured to the collar *q*, surrounding the mortar near the breech. Instead of employing two bars Q a single bar bifurcated will answer all purposes, the bifurcated ends being attached one to each block O and the other end to the collar *q*. The distance between point *r*, which is the axis of the trunnion, to the point *r′*, the point of attachment of the bar Q to the collar *q*, is equal to the distance between the point r^2, the axis of the axle, and the point r^3, the axis of the wrist-pin. Hence the walking-beam and bars Q are parallel and move in parallel planes, thus causing the mortar in recoiling to move parallel to the angle at which the mortar was fired.

To change the firing angle of the mortar, it is simply necessary to move the blocks either to the right or left until the mortar assumes the angle desired.

As the blocks O move to either side of the vertical plane of the axle the wrist-pins carried by the arms depending loosely from the axle move up the slots *i*, and hence always keep the points r^3 a uniform distance from the point r^3, thus preserving the parallelism between the bars O and the walking-beams.

As the arms carrying the wrist-pins are loose on the axle, the oscillation of the walking-beams has no effect on the arms.

By the above arrangement of parts the energy of recoil is considerably reduced, and by locating the weight directly over the center of the carriage the latter will not bind in its seat.

It is evident that many slight changes and alterations might be resorted to in the relative arrangement of parts herein shown and described without departing from the spirit and scope of my invention. Hence I would have it understood that I do not restrict myself to the exact construction herein shown; but,

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

1. The combination with a carriage, a plunger under said carriage and a cylinder in which said plunger moves, of supports on the carriage, walking-beams journaled in the supports, a gun mounted on the beams at one end, a counterweight carried by the beams at the opposite end, hydraulic devices on the carriage, a pipe connecting the hydraulic devices on the carriage with the hydraulic devices under the carriage, and means connecting the walking-beams with the plunger of the hydraulic devices on the carriage, substantially as set forth.

2. The combination with a cylinder, an air-chamber communicating therewith and a carriage, of walking-beams on the carriage, a gun and a counterweight carried by said walking-beams, hydraulic devices on the carriage, a pipe leading from the hydraulic devices on the carriage to the cylinder and air-chamber, and means operated by the walking-beams for ac-

tuating the hydraulic devices on the carriage, substantially as set forth.

3. The combination with a carriage, a cylinder and piston below same, and a cylinder and plunger carried by the carriage, of a walking-beam, carrying a gun at one end and counterweight at the other end, a pipe connecting the cylinder on the carriage with the cylinder below the carriage, a toothed segment secured to the axle of the walking-beam and a toothed cross-head engaging the teeth of the segment and connected to one end of the plunger carried by the carriage.

4. The combination with supports, a walking-beam thereon, a gun at one end of the beam and a counterweight at the other end, of a bearing suspended from the axis of the walking-beam, bars connected at one end to said bearings and at the other ends to the gun, and means for moving said bearings in the arc of a circle for changing the angle of the gun.

5. The combination with supports, a walking-beam mounted thereon, a gun carried by one end of the walking-beam and a counterweight by the other end, of loose arms depending from the axis of the beam and carrying bearings, bars secured to said bearings and to the gun, the said bars being parallel with the beam, and movable blocks for shifting the arms and consequently changing the angle of the gun, substantially as set forth.

6. The combination with supports, a walking-beam mounted thereon, a gun carried by one end of the beam, and a counterweight by the other end, of loose arms depending from the axis of the beam and carrying bearings, bars connecting said bearings and the gun, the said bars being parallel with the beam, screws coupled to move in unison and a block on each screw for shifting the position of the depending arms and consequently changing the angle of the gun, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM H. MORGAN.

Witnesses:
H. W. HARRIS,
T. D. RUSSELL.