

J. B. EADS.
Ordnance-Carriage

No. 56,021.

Patented July 3, 1866.

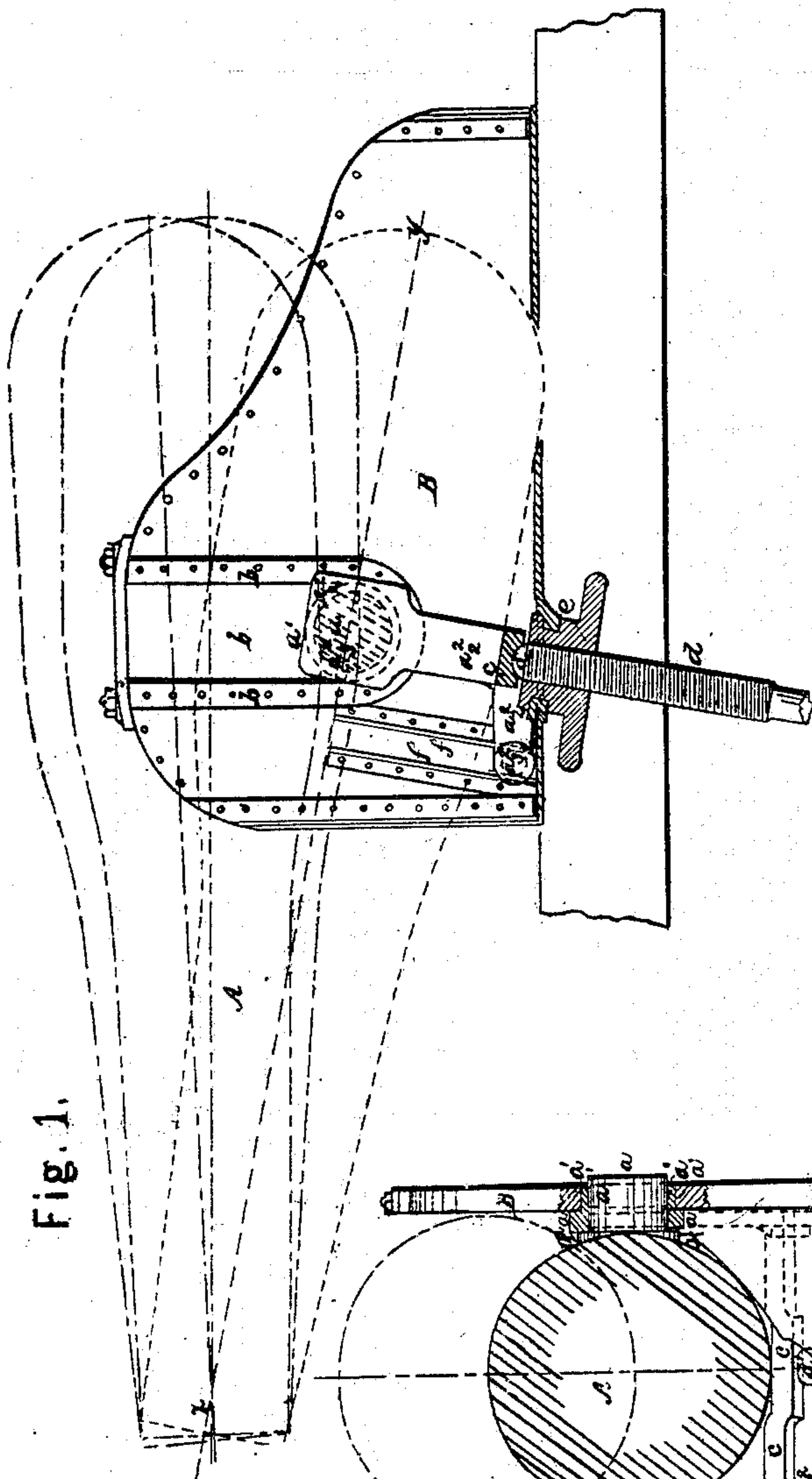


Fig. 1.

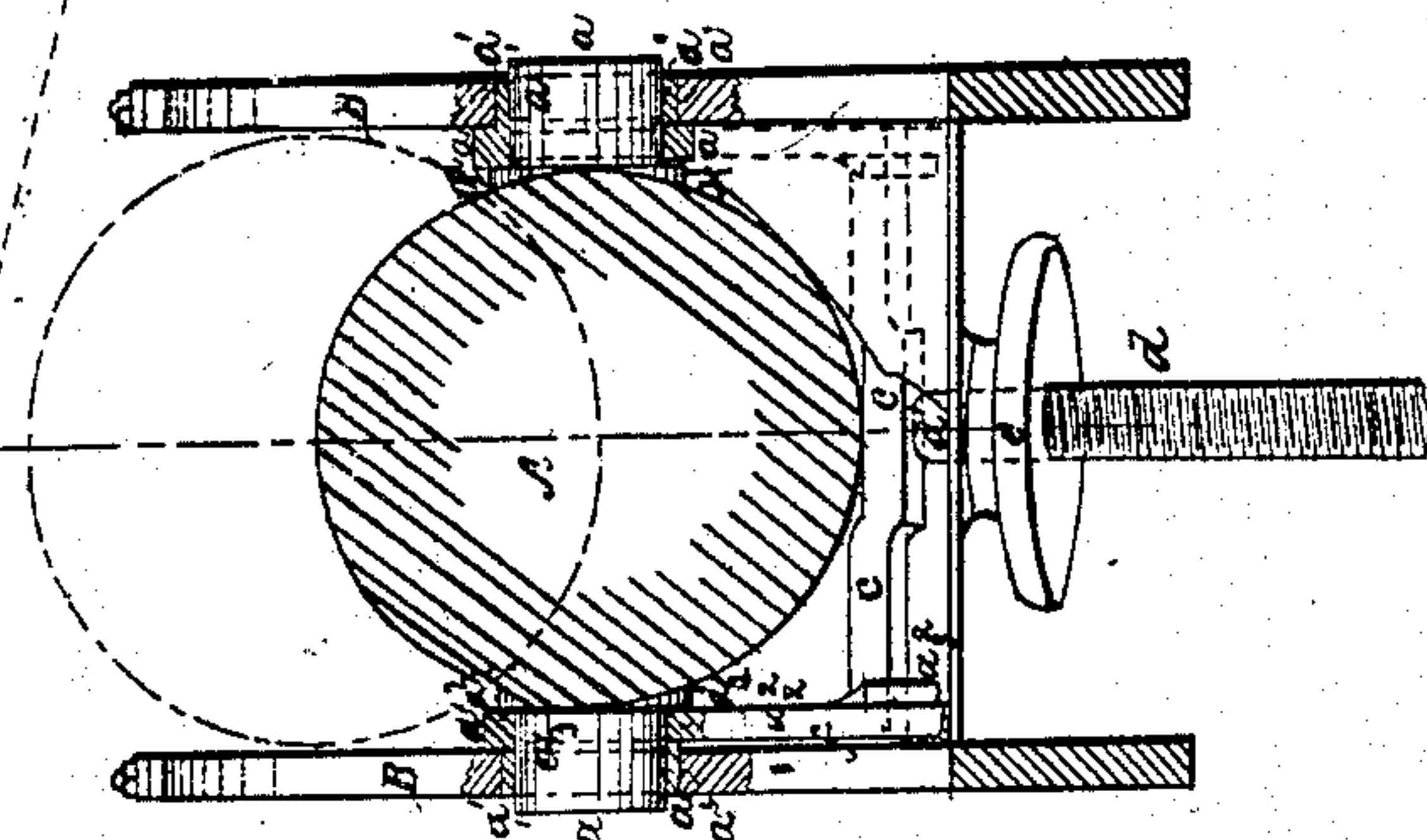
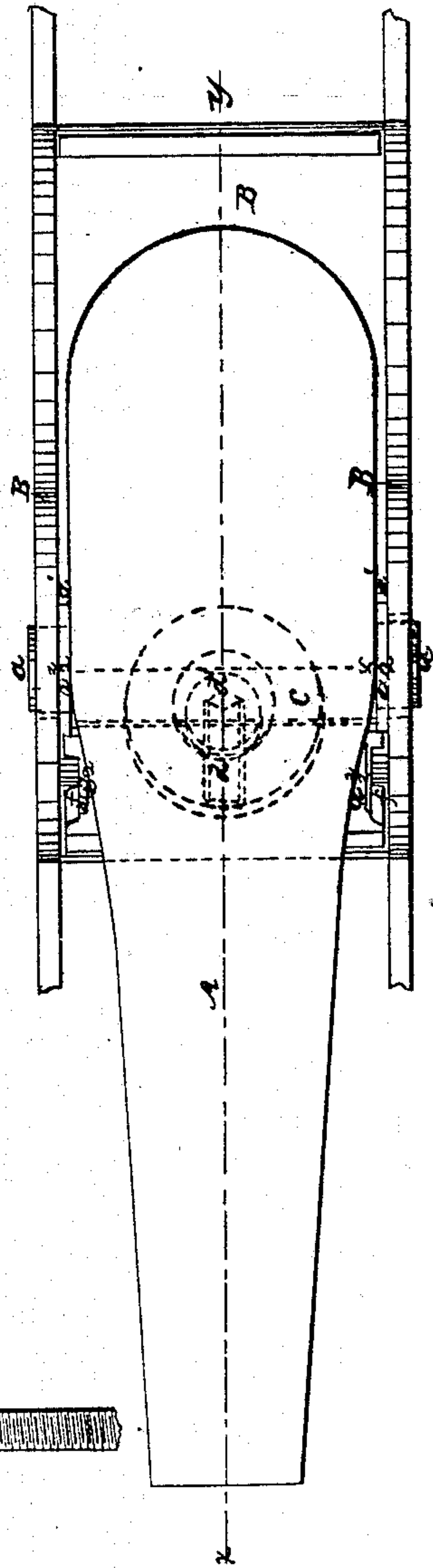


Fig. 2.

Fig. 3.



Witnesses.

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S. M. Randolph

Inventor.

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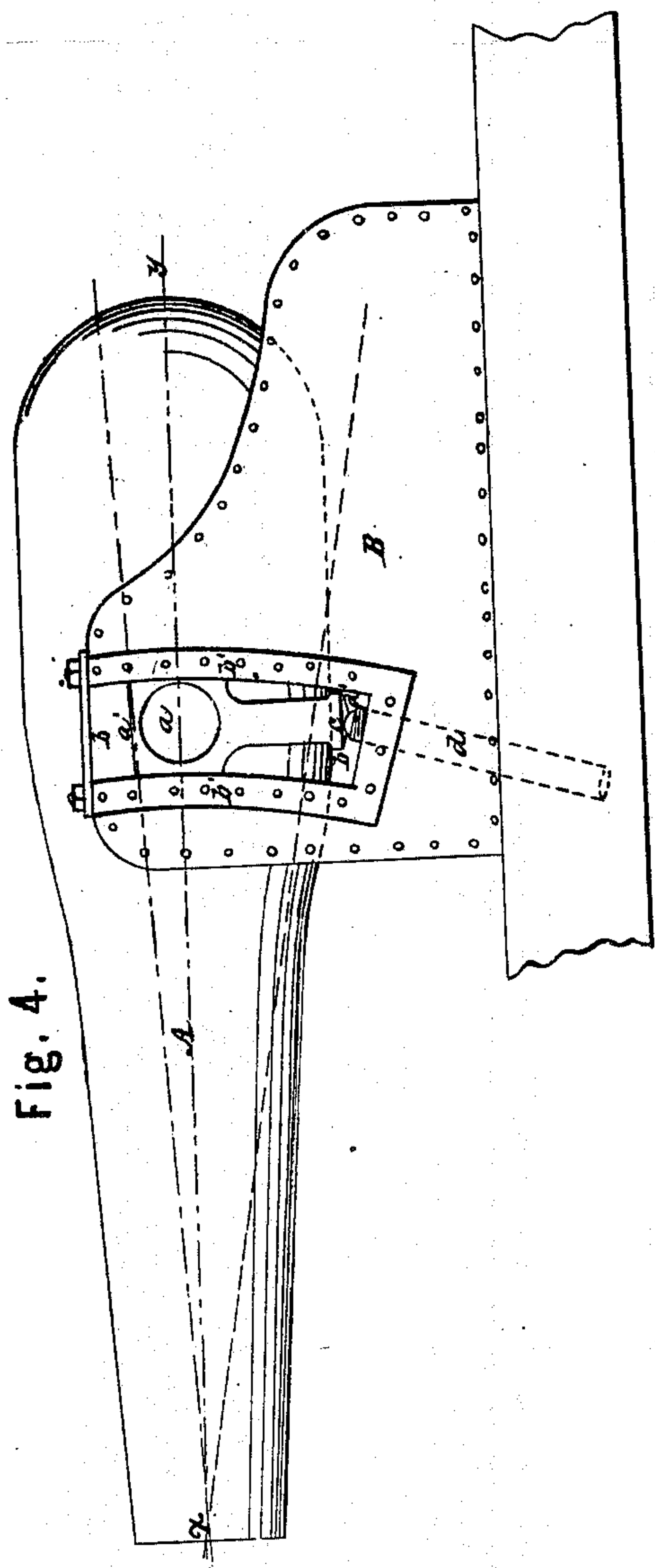


Fig. 4.

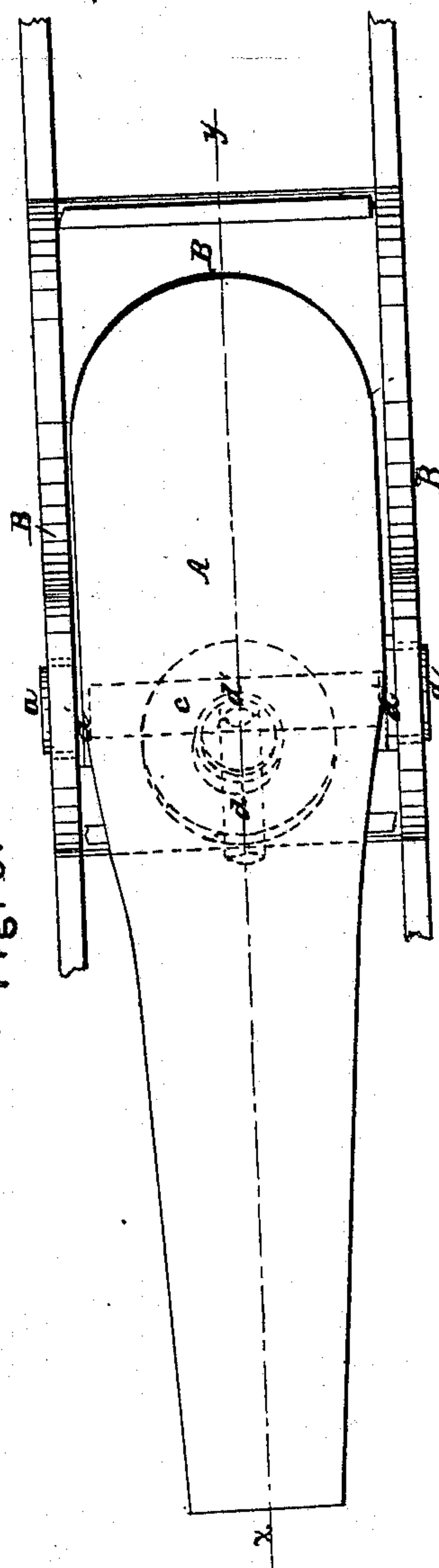


Fig. 5.

Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES B. EADS, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN OPERATING ORDNANCE.

Specification forming part of Letters Patent No. 56,021, dated July 3, 1866.

To all whom it may concern:

Be it known by these presents that I, JAMES B. EADS, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Gun-Directing Machinery; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Of said drawings, Figure 1 is a side elevation, Fig. 2 a front elevation and section, and Fig. 3 a top plan, showing the application of my said improvement, in one of its forms, to heavy ordnance. Fig. 4 is a side elevation, and Fig. 5 a top plan, of a variation from the application shown in the figures preceding.

In all said figures similar letters of reference are used to designate similar parts.

The nature of my invention appertains more specially to directing heavy ordnance for distance-ranges; and the same consists in a method of pendulating the gun about a horizontal axis lying in or near the gun-face, thus allowing a minimum size of port-hole.

To accomplish said motion I secure suitable boxes to the trunnions of the gun, and by causing said boxes and other parts joined therewith to slide in proper slots I give to the said boxes and to the trunnions, and through these to the gun itself, not only a vertical but also a rotary vibration. By said vertical motion of the trunnions they pass in the geometrical sine of the arc of elevation or depression, and by said rotary motion of the trunnions the gun axis is, during the elevation or depression of the trunnions, caused to pass through the varying positions corresponding to the greatest elevation and depression and position lying between said limits.

To enable others skilled in the art to make and use my said improvement, I will proceed to describe its construction and operation.

A represents a gun, a being its trunnions and $x y$ its axis. B represents the gun-carriage, which may be made of the usual materials, and is, in such of its parts as are not here specially described, of the usual construction. The carriage B moves on the slides C.

The parts used to embody and practilize the nature of my invention are as follows: I

fit upon the trunnions a the boxes a' . Said boxes a' are composed of a cylindrical front part, a_1^1 , and the rear part, a_2^1 . I secure the trunnions with the boxes a by a pin, a_3^1 , or by a key or any equivalent means, in such wise that the boxes and trunnions will in all cases move together and in the same direction. The boxes a' move vertically in the slot b of the gun-carriage, and the guiding-surfaces of this slot are properly arranged to allow said vertical motion.

It will usually be well to strengthen the sides of the gun-carriage, especially on the rear part of the slot b , by additional plates, b_1 , so that all parts may be capable to resist great pressures caused by recoil action of the gun or otherwise.

The rear part, a_2^1 , of the box a' guides against the rim-base shoulder of the gun, and may guide on the other side against the plates b_1 of the gun-carriage. With this arrangement the gun would be secure against lateral motion.

The bell-crank lever a_2^2 is the simple prolongation of the rear plate, a_2^1 of the trunnion-box. The opposite levers, a_2^2 , are connected by the supporting-bar c in any manner which insures a secure and permanent connection.

I support the weight of the gun on the center part of the supporting-bar c . In order that this support may be permanent and secure, it is required that the bearing of the gun on this bar should be unchanged during all the changes of position of the gun, and I do claim that in this I have made an especial improvement, inasmuch as by the operation of the parts of my invention said bearing is and remains unchanged.

The weight of the gun, resting on the middle of the bar c , is taken on the screw-shaft d , which receives on its rounded upper end the bar c .

The shaft d is supported in a nut, e , secured to the bottom plate of the gun-carriage. The shaft d may further be connected, by means of bevel-gearing, with a driving-shaft, from which, by means of a hand-wheel, a turning motion is imparted to the screw-shaft.

I would specially state that the manner of imparting rotary motion to the screw-shaft d is in nowise a matter of special import to the improvement to which I lay claim. I do not

therefore confine myself to any description of the manner aforesaid.

By the rotary motion of the screw-shaft d , the nut e being firmly held in the bottom plate of the carriage, the point d' and the supporting-bar c are raised and lowered in the manner usual. Thus the weight of the gun and of such parts as are immediately connected therewith is permanently supported by the shaft d , and from this by the nut e , and finally on the bottom plate of the gun-carriage, while by turning the screw-shaft d the gun may be raised vertically or in any other direction determined by the direction of the slot b and the action of its guiding-edges upon the trunnion-boxes a' .

In order, now, to produce the rotary motion of the trunnions a , I secure a pin, a_3^2 , to the forward end of the bell-crank levers a_2^2 . In the motion of the trunnions in a vertical direction this pin is forced by the guides f to pass in the direction of said guides. In order that there may be less friction in this motion a friction-roller may be put upon the pin a_3^2 , and this is then guided by the guides f .

I have found that if the direction of the guides f be a straight line, and perpendicular to the axial direction of the gun at its greatest elevation, the action of this guided motion on the bell-crank lever a_2^2 and upon the trunnions will be to turn the same during the vertical motion of the trunnions, so that the axis of the gun passes through the varying angles of elevation and depression.

It is my opinion that the exact direction in which the center of the pin a_3^2 must be guided is a very flattened parabolic arc or a combination of parabolic arcs; but I especially claim that by using a straight line for said parabolic curves no practically appreciable error is made in the working of the parts of my said invention, as aforementioned. Moreover, as the vertical motion of the trunnions and the rotary vibration thereof stand in fixed mathematical relations to each other, and as the bell-crank levers a_2^2 and the cross-bar c , supporting the gun directly on its middle bearing, move in fixed mathematical relations to the parts before stated, if the line connecting the bearing of the gun on c and the center of trunnions be at the greatest elevation at a fixed angle—say an angle of one hundred and twenty degrees—to the gun-axis, this angle will be maintained during the entire pendulation of the gun. Hence the bearing of the gun on the support c will be and remain unchanged and secure.

I will next describe the variation from the arrangement just mentioned, as represented in Figs. 4 and 5.

I support the gun, as before, on the cross-bar c and screw-shaft d and connections, and perform the vertical motion of the gun or the vertical component of this motion, as before, by turning the shaft d . During said vertical motion the gun is again guided at the trunnions a by the trunnion-boxes a' , passing in slots b of the carriage; but these slots are here made arcs of circles whose center is the center of motion of the gun itself, x . The trunnion-boxes a' fit said circular arcs, and as, by the screw-shaft d , the gun is raised, and its trunnions also rise, these assume at their axial line all radial positions, and cause the gun to assume the same, said positions corresponding to the varying angles of elevation and depression. In this case, however, the supporting-nut e of the screw-shaft d should have a journal-support, allowing the shaft to vibrate suitably to the changes of position of the upper connecting parts.

Moreover, instead of said screw-shaft d , a simple cam may be used to raise the gun in this instance.

Having thus described my invention, what I claim is—

1. The arrangement and combination of the gun-trunnions a with the boxes a' , levers a_2^2 , the support c , screw-shaft d , nut e , and connections, acting to permanently support the gun at d' and to raise and lower the same, substantially as set forth.

2. The arrangement and combination of the trunnions a , boxes a' , slots b , levers a_2^2 , pin a_3^2 , and guides f , as shown in Figs. 1, 2, and 3, or their general equivalent combination of the trunnions a , boxes a' , and circular slots b of Figs. 4 and 5, when used to produce changes in the axial direction of the gun, substantially as set forth.

3. The combination and arrangement of the different parts mentioned in my foregoing first and second claims to produce a pendulous gun-motion about a horizontal axis lying in or near the face of the gun, as set forth.

JAS. B. EADS.

Witnesses:

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HORACE HERWEGH.