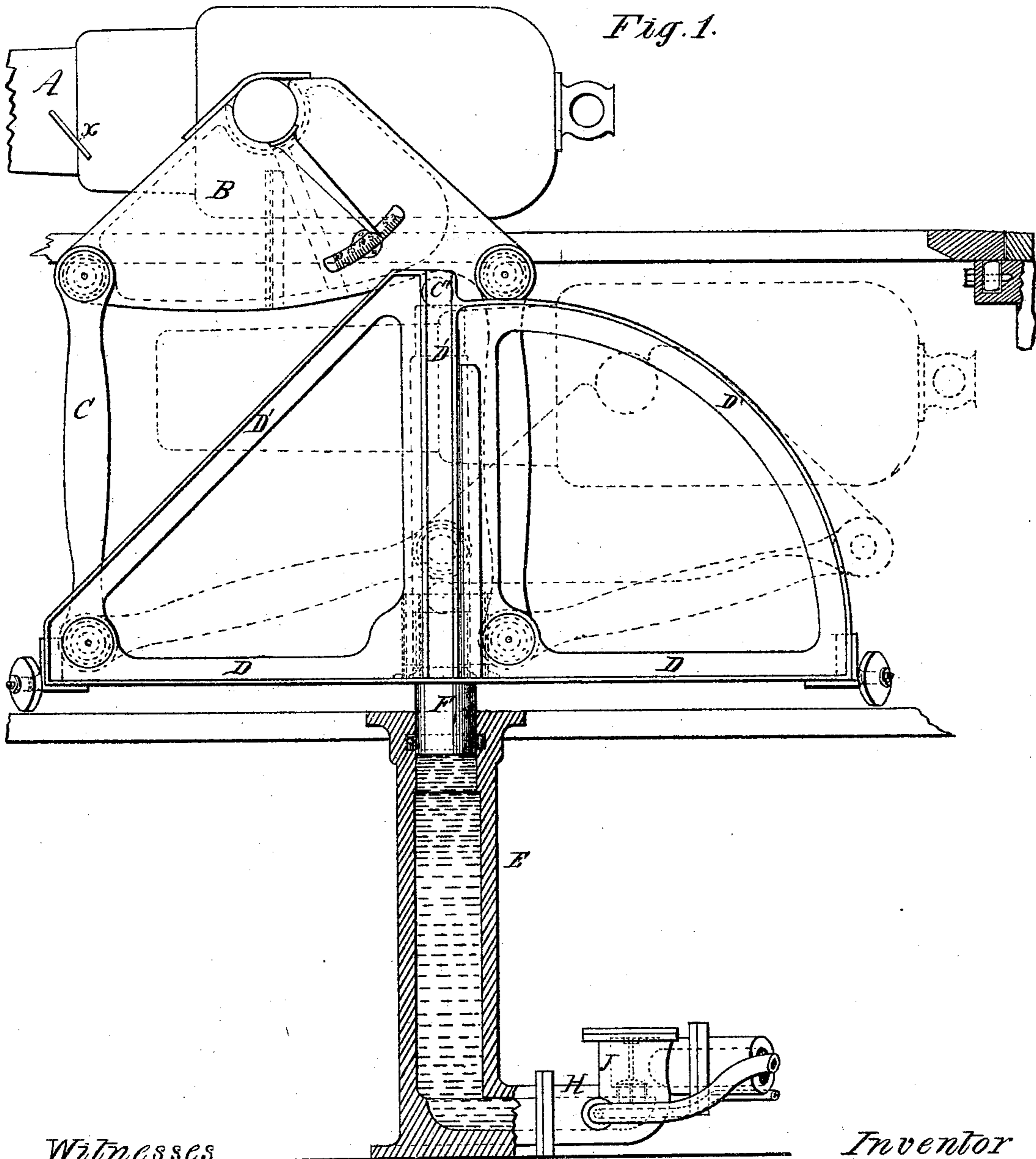


A. MONCRIEFF.

Means of Operating Heavy Guns.

No. 144,120.

Patented Oct. 28, 1873.



Witnesses

Chas D Abel
John B. Millard

Inventor

A. Moncrieff
by *Chas S Whitman*
att'y in fact

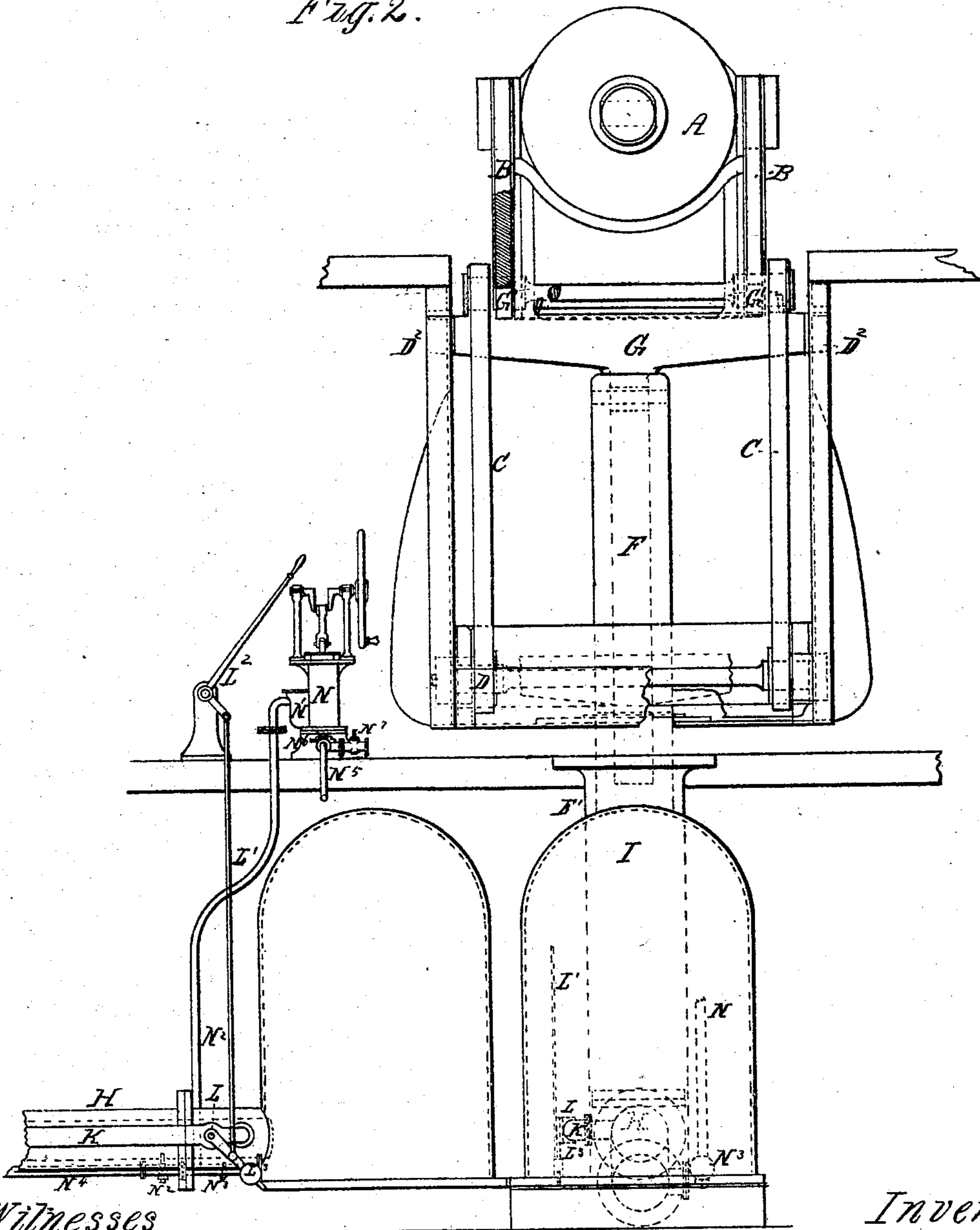
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Fig. 2.



Witnesses

Inventor:

Chas D Abel
Jas B Millard

Attest
by Chas S Whitman atty

UNITED STATES PATENT OFFICE.

ALEXANDER MONCRIEFF, OF CULFARGIE, SCOTLAND.

IMPROVEMENT IN MEANS FOR OPERATING HEAVY GUNS.

Specification forming part of Letters Patent No. **144,120**, dated October 28, 1873; application filed June 29, 1870.

To all whom it may concern:

Be it known that I, ALEXANDER MONCRIEFF, of Culfargie, in the county of Perth, Scotland, have invented an improved Mode of, and Apparatus for, Working and Protecting Guns on the "Moncrieff" system; and I do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvement, by which my invention may be distinguished from others of a similar class, together with such parts as I claim and desire to secure by Letters Patent—that is to say:

My invention relates to the employment of confined or hermetically-inclosed air, or other elastic gas, for storing up the force generated by the recoil of guns mounted on the Moncrieff system, while the manipulation of the gun is effected entirely by water, or other unelastic fluid, caused to act inside a working cylinder by the said air or gas under pressure; secondly, in the employment of means whereby the flow of such aforesaid water, or other fluid, from the working cylinder is allowed to take place freely into the air-vessel during the descent of the gun upon firing, while the reflux of the water into the working cylinder for raising the gun into firing position is permitted only through a by-pass, provided with a valve or cock, whereby the commencement and extent of such reflux are regulated to the exact degree required; and also in the provision of means whereby the quantity and pressure of the air or other gas in the air-vessel, as also of the water or other fluid in the air-vessel, may be regulated according as circumstances require.

On the accompanying drawings are shown some of the arrangements by which my invention may be carried into practice. It will, however, be evident that it is equally applicable to the various other arrangements of gun-carriages.

Figures 1 and 2 of the drawings show one arrangement for carrying into effect my improved system of storing and utilizing the force of recoil. Fig. 1 shows a part sectional side elevation, and Fig. 2 shows an end view.

Similar letters of reference indicate similar parts in each of the figures.

My gun, A, is mounted upon a carriage, B, supported by links C, working on fixed fulcrums on the platform D. Beneath the platform D is fixed a strong metal cylinder, E, having a plunger, F, to the upper end of which is fixed a strong cross-head, G, working between guides D² D² on the framing D¹ fixed to the platform, which cross-head carries two anti-friction rollers, G' G', which bear against the under side of the gun-carriage B, so that, on the descent of the gun into the position shown in dotted lines by the force of recoil on firing, the carriage B forces the plunger F down into the cylinder E. The cylinder E, when the plunger is in the raised position, is full of water, oil, or other suitable liquid. The lower end thereof is put in communication by means of a pipe, H, with a strong air-vessel, I, which also contains enough water to cover the opening of the pipe H, so as to completely isolate the air above such opening. On the forcing down of the plunger the water is forced out of the cylinder E through the pipe H into the air-vessel, the air in which is thereby compressed to a corresponding extent; and such pressure is prevented from reacting through the pipe H in the cylinder by means of a stop back-valve, J, placed in the pipe. A communication is, however, established between that part of the pipe H below the valve J and the part beyond it by means of a by-pass or pipe, K, provided with a valve or cock, L, maintained in the closed position indicated by the weighted arm L³, the opening and closing of which valve or cock are regulated by means of the spindle L¹ passing up to the gun-deck or platform, or any other convenient position, where it is actuated by the lever L².

From this arrangement it will be seen that, assuming the valve to be closed, then, on the descent of the gun, after firing, it will be maintained in such lowered position until, by the opening of the valve L, the compressed air in the air-vessel is allowed to force the water back through the by-pass K into the cylinder E, whereby the plunger F will be forced up and the gun raised into firing position above the deck or cover *a*. It will also be seen that, by opening the valve L to a greater or less de-

gree, such raising of the gun will be effected at a greater or less speed, and thus the manipulation of the gun will be under the most perfect control, any excess of power produced by the recoil beyond that required for raising the gun into firing position being destroyed by the friction produced in obstructing the passage of the water from the air-vessel into the cylinder. The air in the air-vessel, being hermetically inclosed by the water contained in the lower part of the air-vessel, it will be evident that no leakage can take place; but, as for the proper working of this system it is essentially necessary that the air in the air-vessel should be under a certain degree of compression, even when the gun is in the raised position, (in order to balance the pressure of the column of water in the working cylinder, the weight of the gun, which is not supported by the links C, and also to overcome the friction of the working parts toward the end of the upward motion of the gun,) a small pump, N, is provided, the delivery-valve N¹ of which communicates, by means of the pipes N² N³, with the bottom of the air-vessel, by means of the pipe N⁴ with the cylinder E, while the inlet-valve may be made to communicate, either by means of the pipe N⁵ and cock N⁶ with a water-tank, or by means of the cock N⁷ with the atmosphere. By this arrangement, if the cock N⁷ and the cock N⁸ on the pipe N³, are opened, air can be pumped into the air-vessel until any desired pressure (to be indicated by a pressure-gage) is attained, whereas, if the cock N⁶ and the cock N⁹ on the pipe N⁴ be opened, water may be forced, either into the cylinder E alone, (the cock N⁸ being closed,) or both into the cylinder and the air-vessel, in order to make good any leakage that may occur, or to raise the gun into the firing position, should, by any chance, the air-vessel get out of order, as also to adjust the pressure in the air-vessel to meet cases where abnormal charges are used, or to counteract the effect of rolling during action in a heavy sea. A cock or valve may also be provided at the bottom of the cylinder E, as also under the air-vessel I, for letting off the water, should it at any time be required to lower the gun into the loading position without firing, or to decrease the pressure to any required amount. If desired, also, a water-gage may be applied to the air-vessel to assist in regulating the proper adjustment of the apparatus.

It will be observed that this system of working guns by hydraulic apparatus will render possible a manipulation of the guns in action, which the ordinary, or any previous, system is incapable of affording. Thus, for instance, by

carrying a prolongation of the small by-pass pipes with their regulating-valves to the station of the officer who is conducting the action, he may himself effect the raising of the guns to the firing position with his own hand, and fire them by electric fuses after they had been correctly laid to his instructions, the lateral angle being given by provisions similar to those proposed by me for land service, and the elevation by the Moncrieff trunnion-pointer. The parallel motion would leave an error so slight, if the gun were not raised, that it would in no case affect the aim. The advantage of simultaneous volleys and taking aim from above the smoke may be obtained in the highest degree by the above arrangements, which, of course, presuppose the provision of control over the steering at the station referred to, and of a movable sight which works in harmony with those of the guns, and by which the officer in command can give the necessary directions for laying, whether as regards elevation or the lateral angle. It is obvious that the rigidity of the structure of a vessel is quite sufficient to insure practically perfect accuracy when the angles at the two positions are set in harmony and correctly.

I do not claim this method of controlling the firing, laying, and working the guns from one position, as forming of itself any part of my present invention, although, of course, from the nature of the case, it cannot be fully carried out, except in combination with my invention.

Having thus described the construction and relative arrangement of the component parts of my invention, I will now indicate in the following clauses what I claim as new and desire to secure by Letters Patent of the United States—

1. The construction of the parts herein described, whereby the air is hermetically inclosed in a reservoir, and the action thereof controlled by a stop back-valve for retaining the air-pressure when the gun has descended after firing, and by a by-pass, provided with a valve for allowing the air-pressure to effect the raising of the gun-carriage.

2. The air-pump N, when constructed and combined as described, with the air vessel I and cylinder E, for the purpose of furnishing air to the air-vessel and water to the cylinder, as may be required.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 30th day of May, 1870.

A. MONCRIEFF.

Witnesses:

CHAS. D. ABEL,

JNO. P. M. MILLARD.