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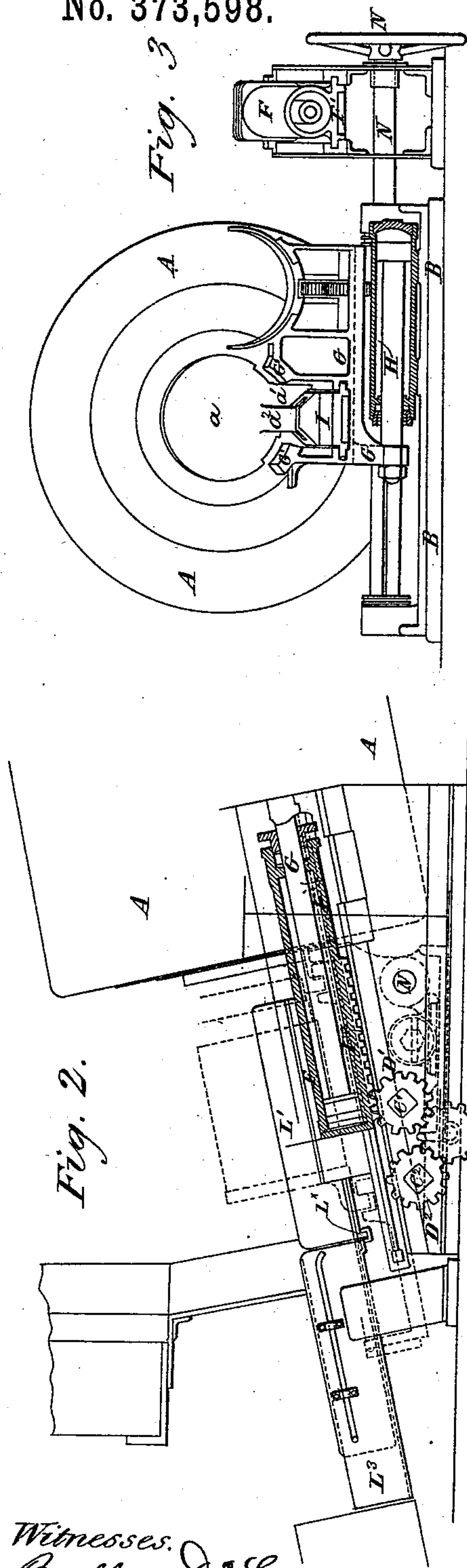
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C. H. MURRAY.

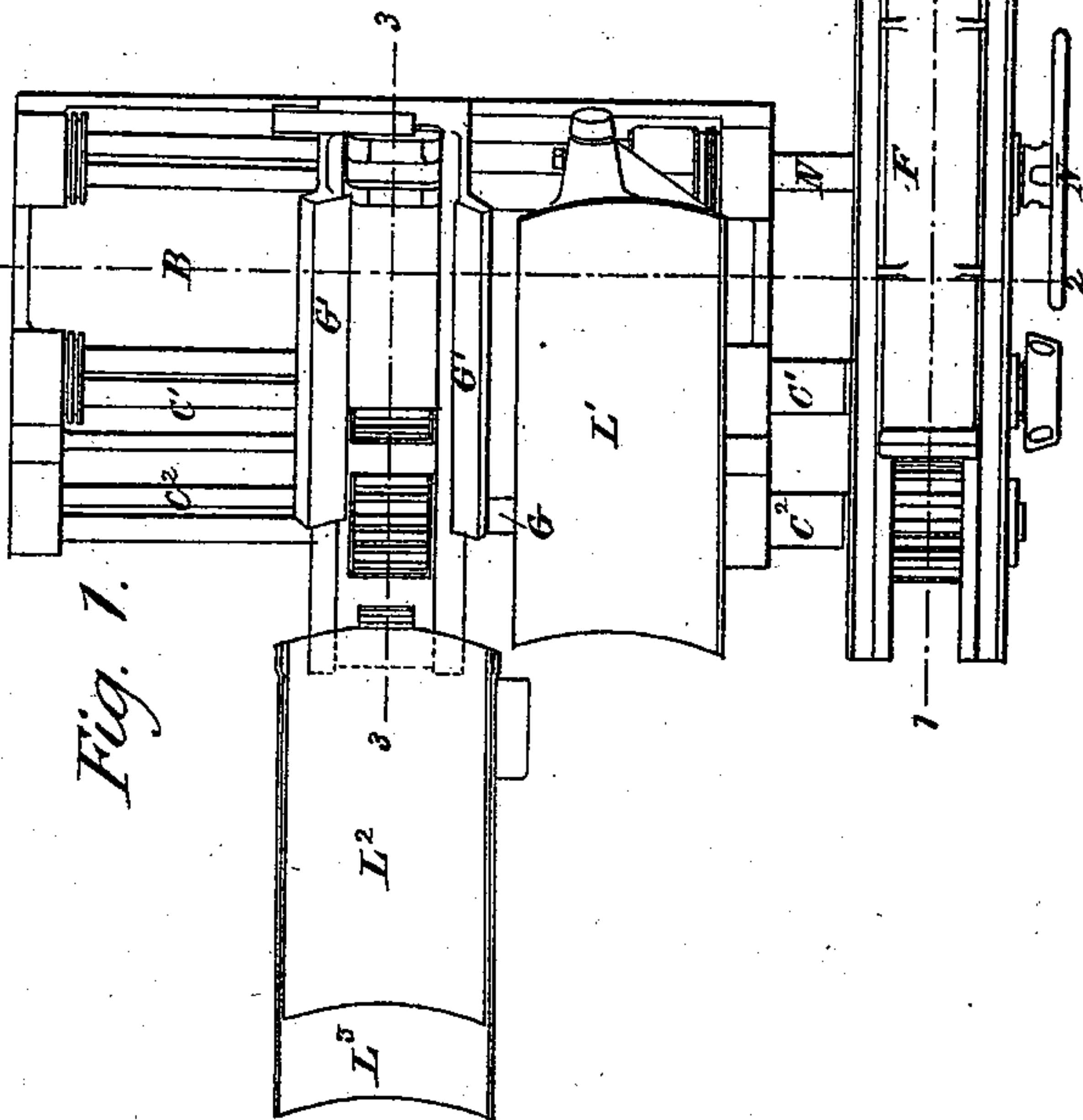
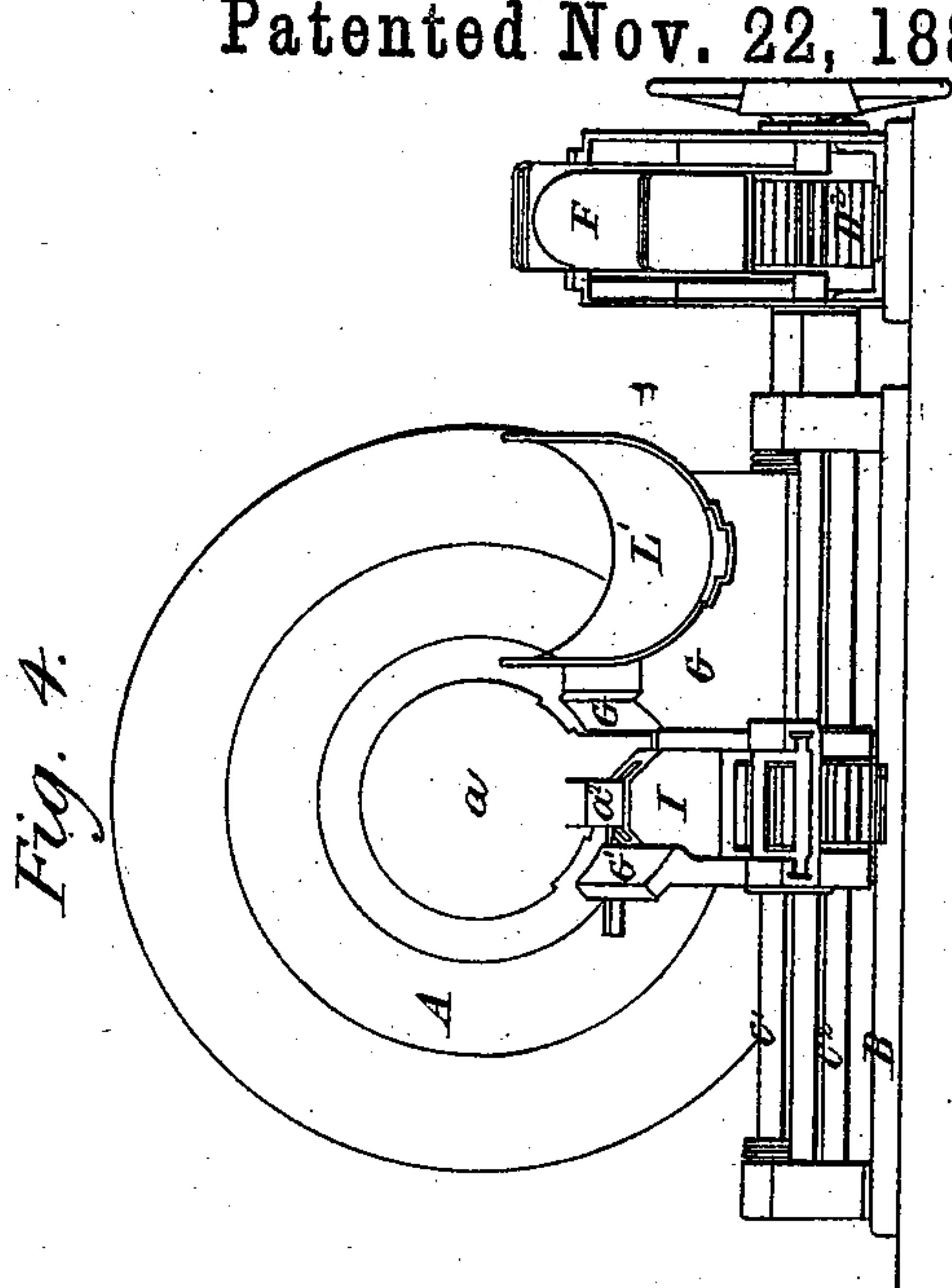
APPARATUS FOR OPENING AND CLOSING THE BREECH OF HEAVY GUNS.

No. 373,598.

Patented Nov. 22, 1887.



Witnesses.
Baltus DeLong.
Lloyd B. Night



Inventor.
C. H. Murray.
By Atty - [Signature]
[Signature]

(No Model.)

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C. H. MURRAY.

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Fig. 5.

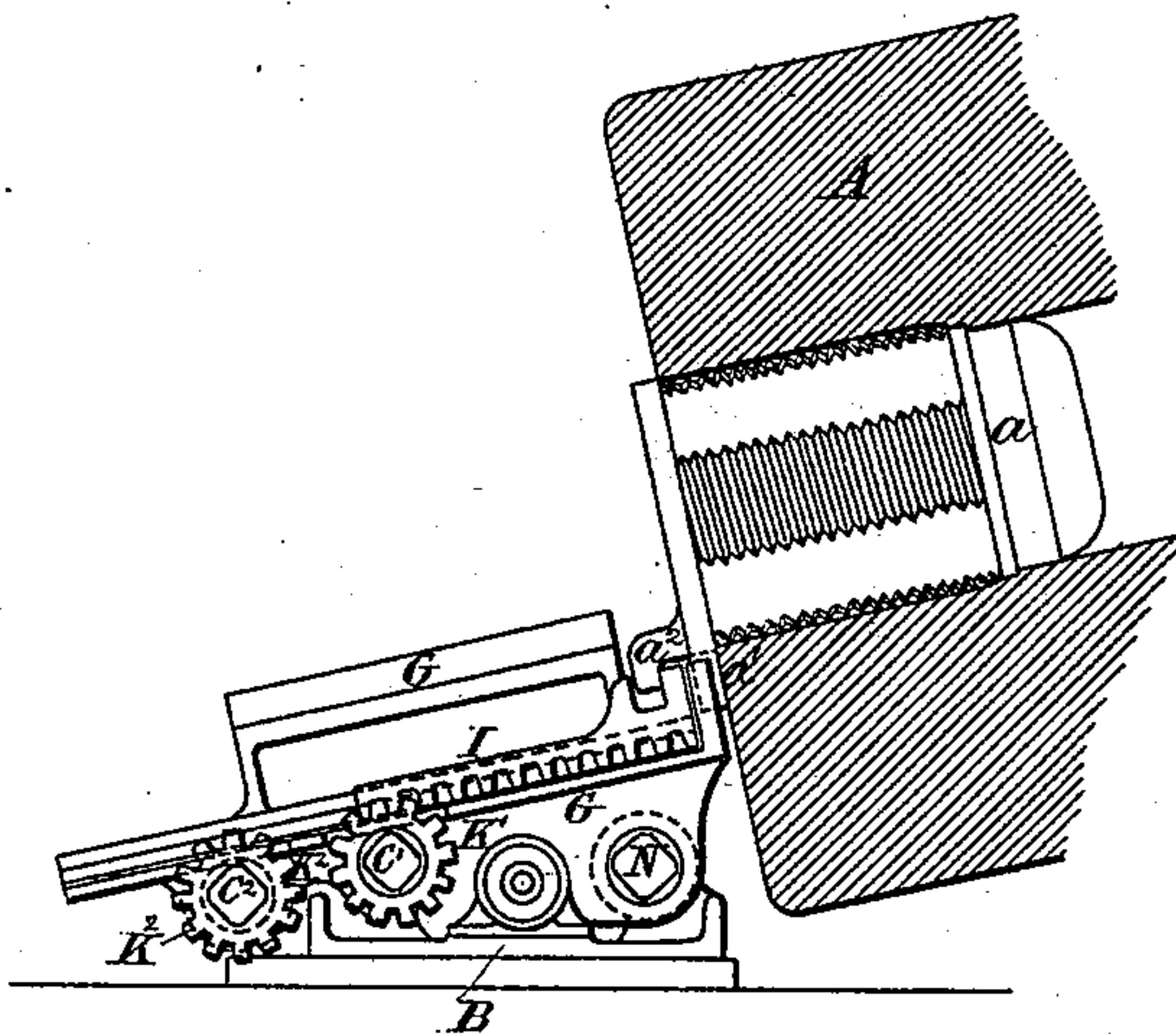
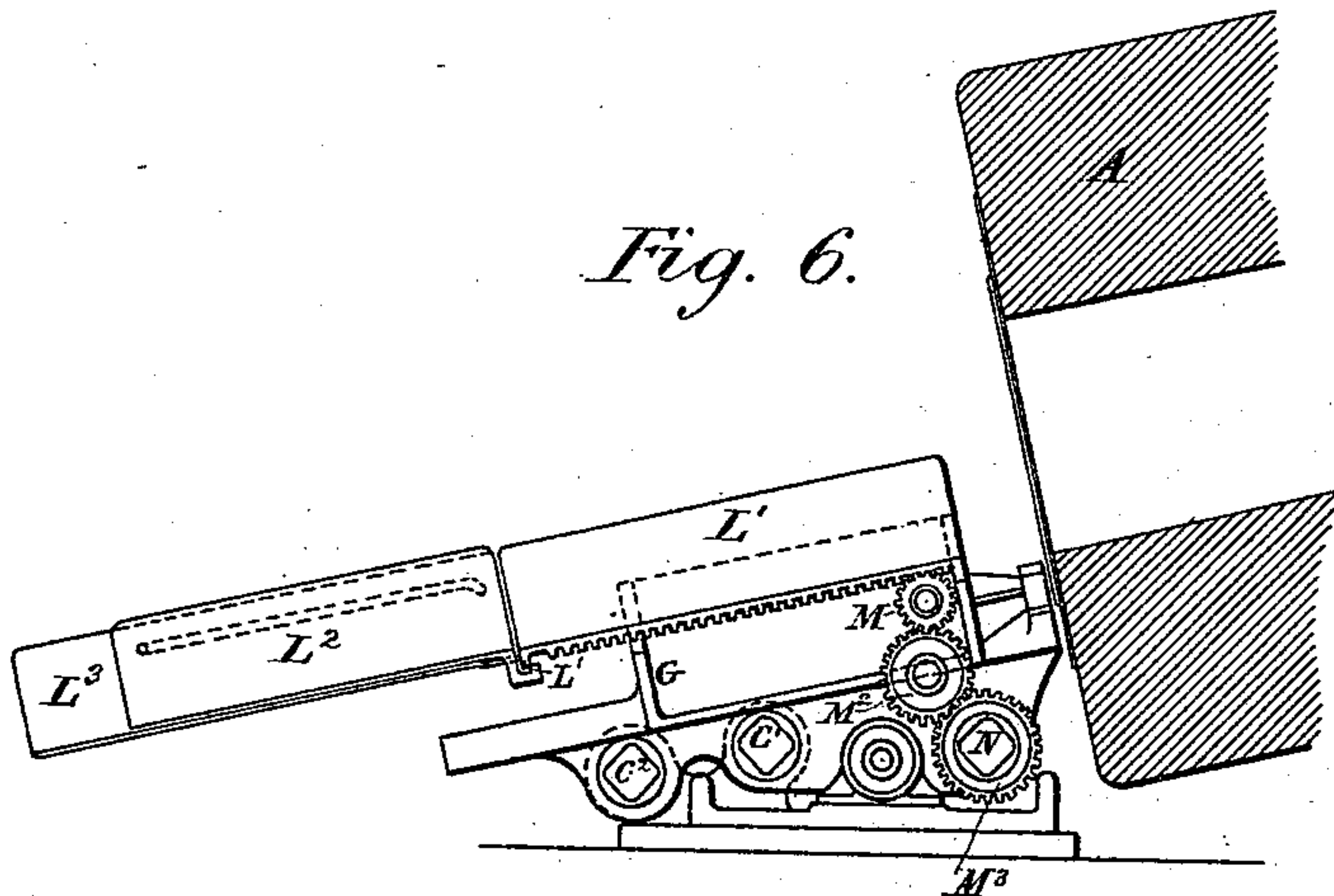


Fig. 6.



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UNITED STATES PATENT OFFICE.

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W. G. ARMSTRONG, MITCHELL & CO., (LIMITED,) OF SAME PLACE.

APPARATUS FOR OPENING AND CLOSING THE BREECH OF HEAVY GUNS.

SPECIFICATION forming part of Letters Patent No. 373,598, dated November 22, 1887.

Application filed June 8, 1887. Serial No. 240,611. (No model.) Patented in England January 6, 1885, No. 205, and in Italy March 31, 1885, No. 18,018.

To all whom it may concern:

Be it known that I, CHARLES HENRY MURRAY, a subject of the Queen of Great Britain, residing at the Elswick Works, Newcastle-upon-Tyne, England, engineer, have invented certain new and useful Improvements in Apparatus for Opening and Closing the Breech of Heavy Guns, (for which Letters Patent have been granted to me in Great Britain, dated January 6, 1885, No. 205, and in Italy dated March 31, 1885, No. 18,018,) of which the following is a specification.

This invention has for its object improvements in apparatus for opening and closing the breech of heavy guns.

In guns having the breech closed with a screw with divided thread the following operations are necessary: first, to turn the screw through a certain angle; second, to withdraw the breech-screw from the gun; third, to remove the breech-screw to one side out of the way. To close the breech the processes are reversed. I effect these operations by means of mechanism as follows: I provide behind the gun a saddle, which is connected with a piston in a hydraulic cylinder and which thus can be moved to and fro in a transverse horizontal direction. When the breech is being opened, the saddle strikes a projection on the breech-screw and so turns the breech-screw until the divided threads upon it are clear of those in the breech of the gun. The saddle carries a rack, and the same movement of the saddle which unlocks the breech brings this rack into position to engage with a lug upon the breech-screw. The rack then retires, moving transversely to the path of movement of the saddle or in a direction parallel with the axis of the gun. It draws back the breech-screw with it and lodges it between suitable supports on the saddle. The rack is actuated by pinions beneath it. These are mounted so as to be able to slide with the movement of the saddle along two parallel horizontal transverse axes. On these axes, near their ends, are other pinions gearing with a rack formed upon a hydraulic cylinder having a fixed piston and rod. The cylinder, by a movement par-

allel to the axis of the gun, rotates the axes carrying the pinions, and so at the proper time retires the rack with the breech-screw, as already stated. When the breech-screw is lodged upon its supports, another transverse movement of the saddle conveys it away to one side.

To facilitate the loading, a guide-tray is employed. It is made in sections, and one of these sections, preparatory to loading, is caused to enter into the gun and to cover the divided screw-threads in the breach while the shot and powder charge pass over them. This section is carried upon the saddle in suitable guides. It has a rack on its under side, which, by intermediate pinions, is geared with a pinion on a transverse horizontal axis, along which it slides during the movement of the saddle. This axis can be rotated by means of a hand-wheel. Preparatory to loading, the movement of the saddle brings the tray-section, which it carries, into position to advance into the gun and at the same time causes it to engage in rear with another section able to slide telescopically into and out from a third section. When the section on the saddle is caused to advance into the gun, it draws forward the second section with it, and so the continuity of the loading-tube is maintained. After the loading, which is performed by mechanism forming no part of the present invention, the front section of the tray is withdrawn from the gun. The movement of the saddle detaches it from the other sections and also brings the breech-screw into position to enter the gun. Then the advance of the main rack carries the breech-screw to its place, and another movement of the saddle turns and locks it.

In order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

In the drawings, Figure 1 is a plan of the apparatus to be used for loading heavy guns and constructed in accordance with my invention. Fig. 2 is a section taken on the line 1 1 in Fig. 1. Fig. 3 is a transverse section taken on the line 2 2 in Fig. 1. Fig. 4 is an end ele-

vation. Fig. 5 is a section taken on the line 3 3 in Fig. 1; and Fig. 6 is a section taken also on the line 3 3 as far as relates to the fixed parts, but with the movable parts in another position.

A represents the breech of the gun in position for loading, and a is the breech-screw. It is furnished with projections a' and a'' .

B is the bed of the loading apparatus. It carries the bearings of axes C' and C'' . These axes have pinions upon them, D' D'' , which are geared together by an intermediate pinion, E.

F is a movable hydraulic cylinder. It contains within it a piston upon a rod, F' , which at its upper end is securely fixed. There are passages in the piston-rod by which liquid under pressure can be admitted at pleasure into the cylinder beyond the piston, and by which also this liquid has free access to the portion of the cylinder above the piston. Thus, at pleasure, by opening and closing the valves, longitudinal movement can be given to the cylinder F. The cylinder has a rack, F'' , on its underside, which gears with the pinions D' and D'' , so the axes C' C'' can be rotated at pleasure.

The bed B and the axes C' and C'' carry a saddle, G, which is able to slide upon them in a transverse direction. The saddle is actuated by the hydraulic cylinder H, and this cylinder contains a piston, the rod of which is attached to the saddle, as is clearly seen in Fig. 3. The saddle G carries upon it a rack, I, which is able to slide upon the saddle in a direction parallel to the axis of the gun. This rack engages with pinions K' and K'' on the axes C' and C'' , which pinions slide with the saddle. Grooves in these axes engage with projections within the pinions and cause the pinions to rotate.

L' , L'' , and L''' are the three sections of the loading-tray. One of these, L' , is carried upon the saddle. It has a rack on its under side engaging with the first of a train of wheels, M' , M'' , and M''' , all of which are carried by the saddle, and the last of the train is able to slide upon the axis N, which at its end carries a hand-wheel, N' , by turning which the loading-trays are actuated.

The drawings, Figs. 1, 2, 3, 4, and 5, show the parts in the position they occupy when the breech-screw of the gun has been already unlocked and is ready to be withdrawn. The unlocking has been brought about by the movement of the saddle from left to right, bringing the parts to the positions in which they appear in Figs. 1, 3, and 4. This movement, which was produced by operating the valves in connection with the hydraulic cylinder F, caused a projecting part on the saddle to strike against the projection a' on the breech-screw. Thus the breech-screw has been turned in a direction opposite to that of the hands of a watch. The hook or angular projection a'' on the breech-screw has by this motion been brought into a notch in the head or upper end

of the rack I. The next operation now is to cause the axes C' and C'' to rotate by admitting liquid under pressure to the lower end of the cylinder F. The pinions K' and K'' in rotating now move the rack I rearward. It carries with it the breech-screw a of the gun, drawing it out from its place and depositing it on the supports G' G'' upon the saddle. Movement from right to left is now given to the saddle. It takes away the breech-screw upon it and leaves the breech of the gun exposed, ready to receive the charge. The same movement of the saddle also places the section L' of the loading-tray immediately in rear of the open breech, and it causes the lug L'' upon it to engage with the lip projecting from the under side of the section L''' of the loading-tray. This section is carried within the third section, L''' , which is fixed. The section L'' is capable of movement along L''' , like the slide of a telescope. The hand-wheel is now turned, with the result that the sections L' L'' of the loading-tray are caused to advance, and the leading section L' enters the breech of the gun and covers the threads of the screw within it to protect these threads, while the projectile and charge pass forward along the loading-tray into the gun. Any convenient apparatus may be employed to place the projectile and the charge in succession into the loading-tray and to thrust first the one and then the other forward into the gun. A hydraulic rammer is usually employed in loading guns of these dimensions. The charge being now in place in the gun, the loading-tray is retired by turning the hand-wheel N' in the reverse direction, and the saddle is caused to move from left to right. This brings the breech-screw a back to the breech of the gun and into a position ready to enter it. By means of the hydraulic cylinder F the pinions K' and K'' are again caused to rotate, but now in a direction to carry the rack I forward toward the gun. In this movement the breech-screw is pushed off the supports G' G'' and into the open breech of the gun. A partial movement of the saddle from right to left now causes the breech-screw to rotate, the projection on the saddle operating against the corresponding projection, a' , on the breech-screw. The gun is now ready for firing, and after firing the breech-screw is unlocked by a movement of the saddle from left to right, which brings the parts back to the position in which they are shown in the drawings.

The object of employing two axes, C' C'' , and of duplicating some of the other parts is to enable the rack I to be shortened to a convenient length.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination, substantially as set forth, of the gun provided with a breech-screw, the saddle in rear of the gun and movable

along guides transverse to the gun, the projection on the saddle, and the corresponding projection on the breech-screw which it strikes, the rack carried by and sliding transversely 5 to the path of movement of the saddle, the interlocking devices on the rack and breech-screw, and gear for operating these parts, for the purpose described.

2. The combination, substantially as set 10 forth, of the gun provided with a breech-screw, the saddle in rear of the gun and movable transversely thereto, the sliding front section of the loading-tray carried upon the saddle, the section of the loading-tray in rear of the 15 front section and engaging therewith by interlocking devices, and gear for operating these parts, for the purpose set forth.

3. The combination of the gun provided 20 with the breech-screw, the saddle moving transversely to and in rear of the gun, the

hydraulic cylinder having its piston connected with the saddle to traverse it to and fro, the engaging devices upon the saddle and breech-screw, whereby the breech-screw is turned by the saddle as it is traversed, the rack carried 25 by the saddle and sliding transversely to the path of movement thereof, the pinions engaging the rack, the axes upon which these pinions and the saddle slide, the fast pinions on said axes, the intermediate pinion for gearing 30 together said fast pinions, and the longitudinally-moving hydraulic cylinder provided with the rack for engaging said fast pinion, substantially as and for the purpose set forth.

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Witnesses:

WM. JOHN GREY,
Notary Public.

T. PURVIS.