

(No Model.)

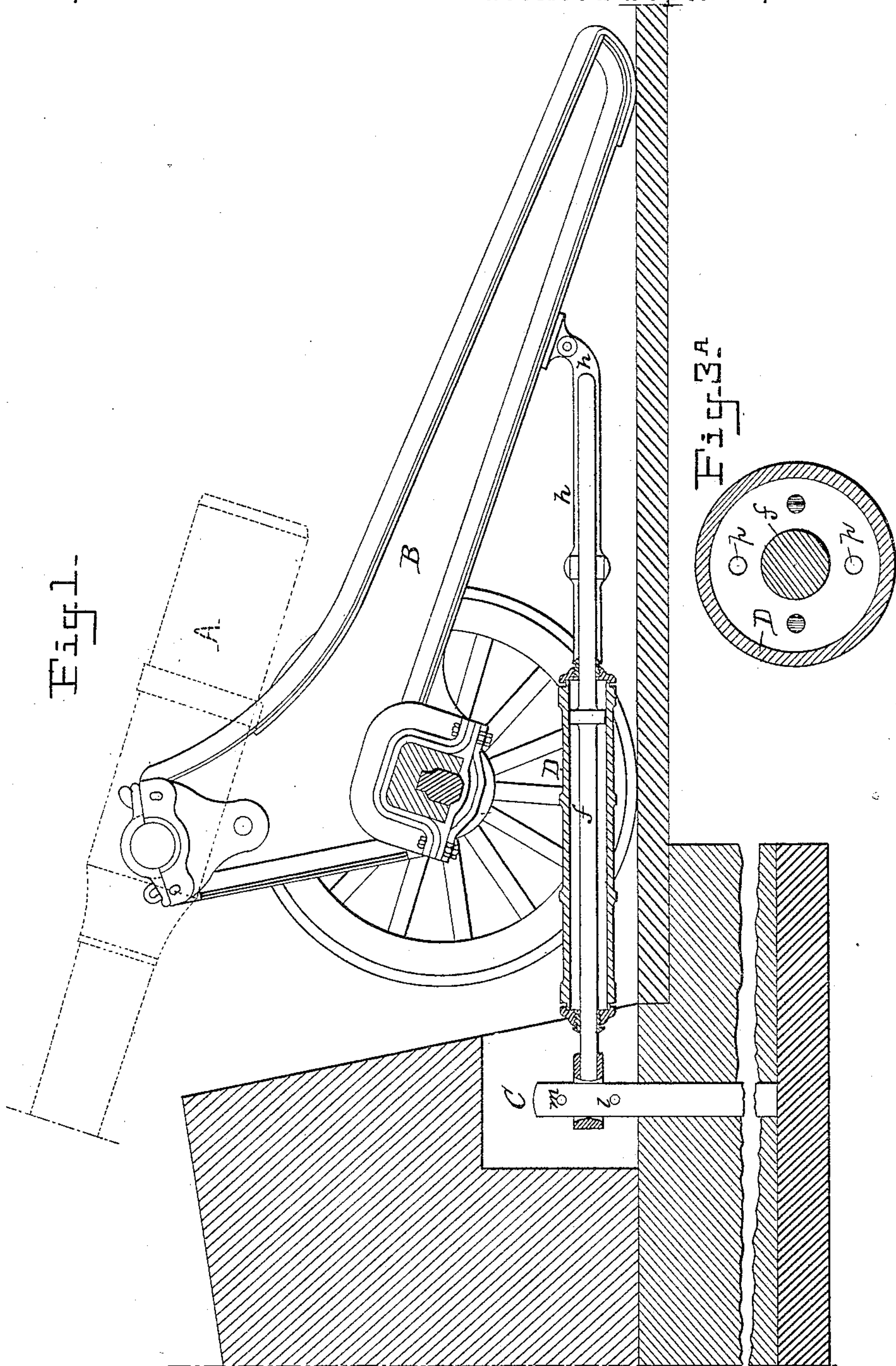
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P. L. A. DE MONTGOLFIER.

HYDRAULIC BUFFER FOR SIEGE OR OTHER GUN CARRIAGES.

No. 411,715.

Patented Sept. 24, 1889.



WITNESSES:

E. J. Griswold.  
John Revell

INVENTOR

Pierre Louis Adrien de Montgolfier  
BY  
Horton and Horton  
his ATTORNEYS.

(No Model.)

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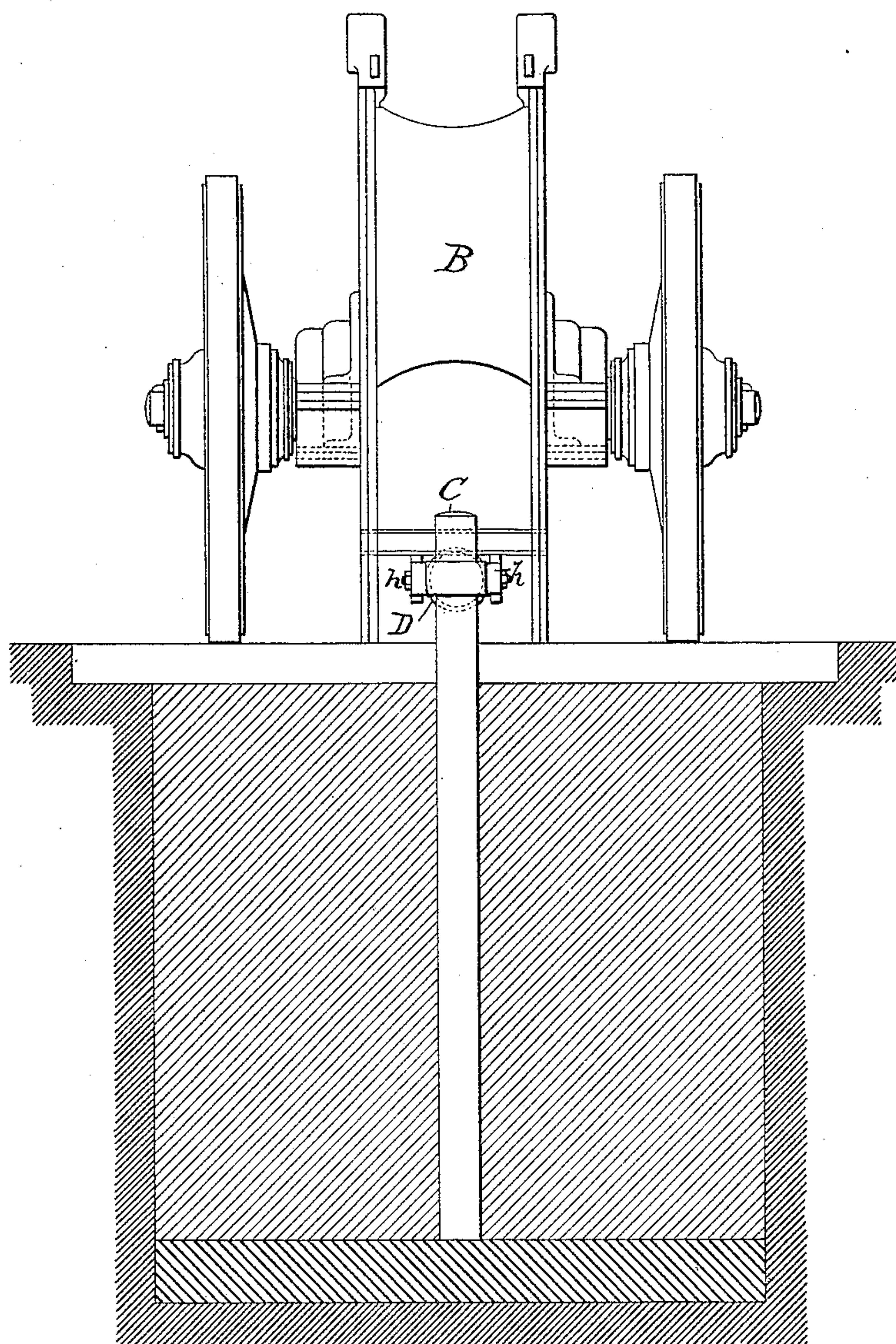
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Fig. 2.



WITNESSES:

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*John Revell.*

INVENTOR

*Pierre Louis Adrien de Montgolfier*

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*Howson and Howson*  
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(No Model.)

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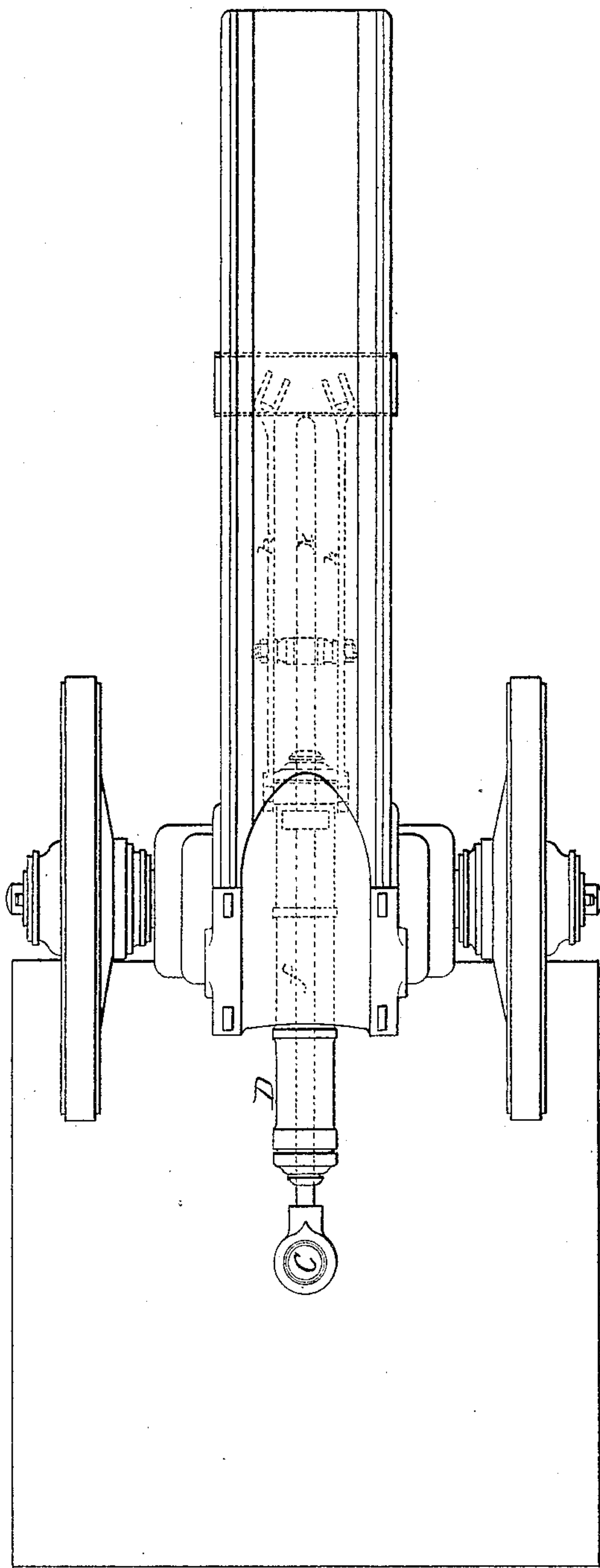
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Fig. 3.



WITNESSES:

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*John Revell.*

INVENTOR

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(No Model.)

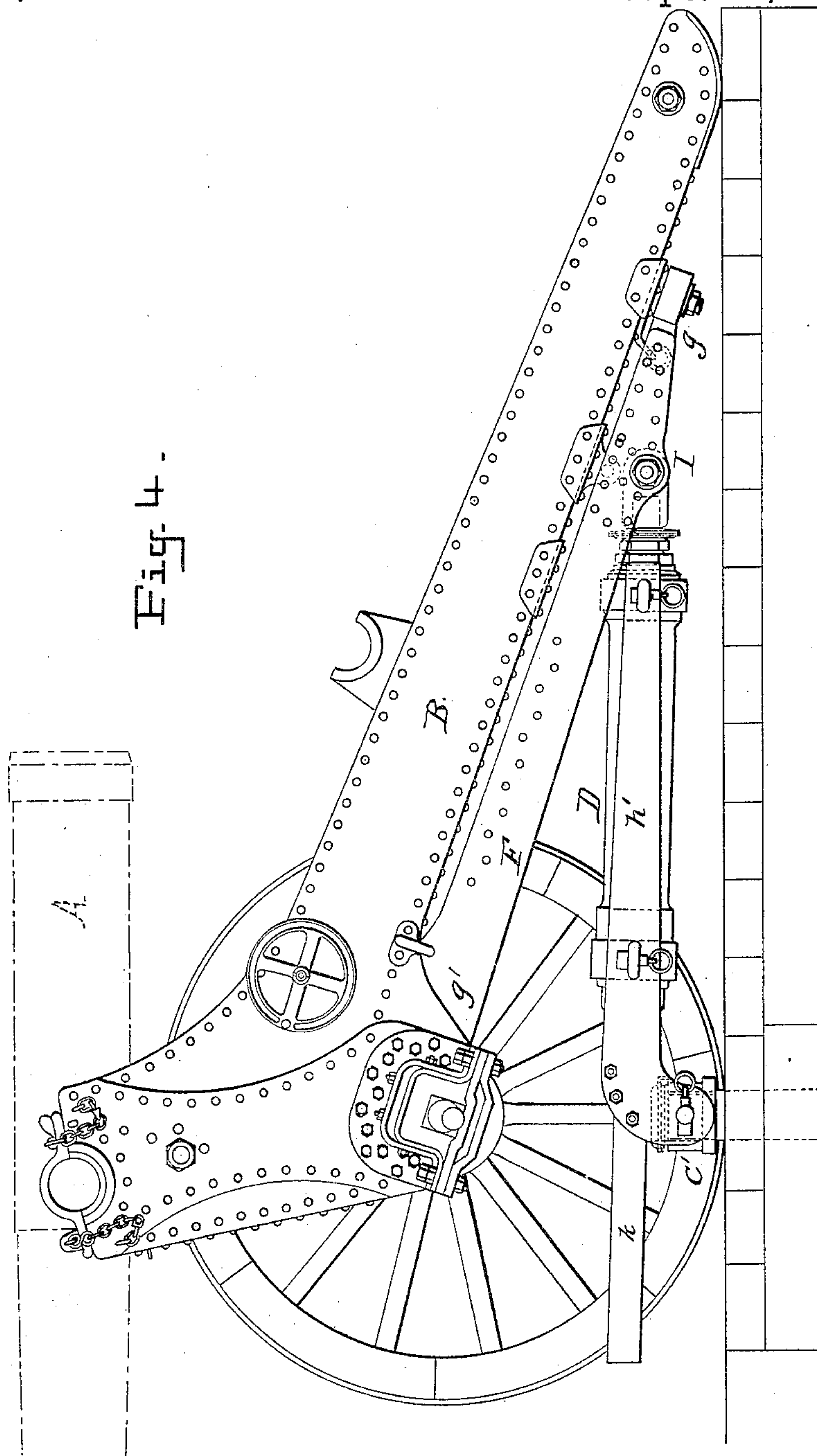
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P. L. A. DE MONTGOLFIER.

# HYDRAULIC BUFFER FOR SIEGE OR OTHER GUN CARRIAGES.

No. 411,715.

Patented Sept. 24, 1889.



WITNESSES:

John Russell  
S. C. Connor

*INVENTOR*

INVENTOR  
Pierre Louis Adrien de Montgolfier

BY

BY  
Horvath and Horvath  
his ATTORNEYS

(No Model.)

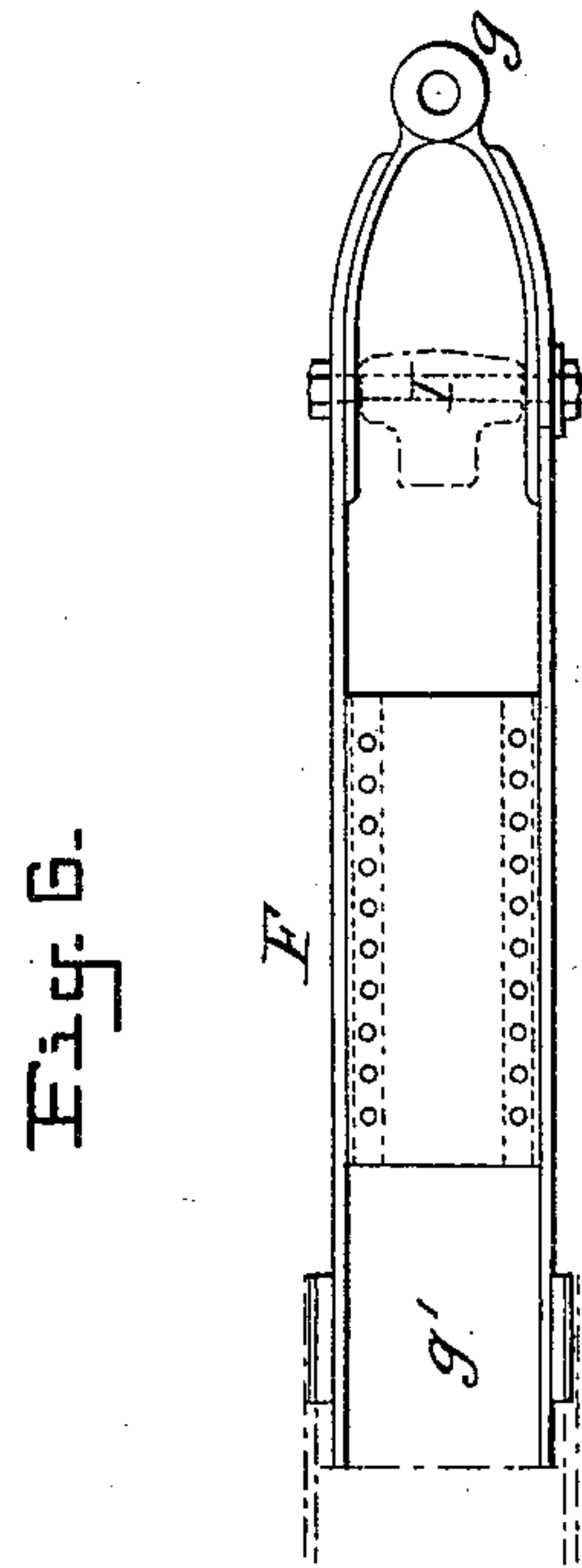
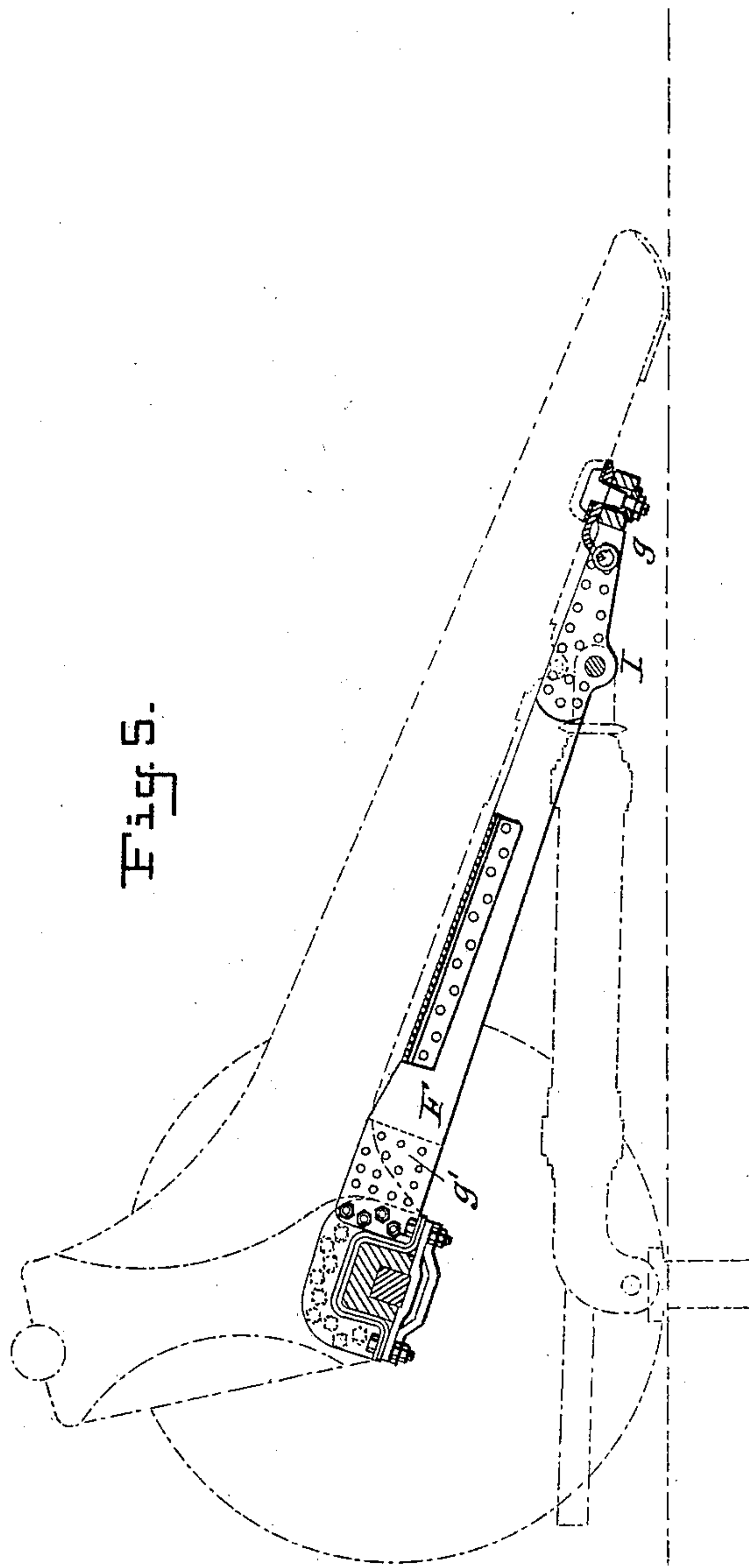
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P. L. A. DE MONTGOLFIER.

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WITNESSES:

E. J. Griswold.  
John Revell

INVENTOR

Pierre Louis Adrien de Montgolfier  
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# UNITED STATES PATENT OFFICE.

PIERRE LOUIS ADRIEN DE MONTGOLFIER, OF ST. CHAMOND, LOIRE, FRANCE.

## HYDRAULIC BUFFER FOR SIEGE AND OTHER GUN CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 411,715, dated September 24, 1889.

Application filed October 2, 1888. Serial No. 286,971. (No model.)

*To all whom it may concern:*

Be it known that I, PIERRE LOUIS ADRIEN DE MONTGOLFIER, a citizen of the French Republic, and residing at St. Chamond, Loire, in the Republic of France, general manager of the Compagnie des Haut Fourneaux Forges et Ancieries de la Marine et des Chemins de Fer, have invented a certain Hydraulic Buffer for Siege and Other Gun Carriages, of which the following is a specification.

This invention consists in the application of a special construction of hydraulic buffer designed to limit the recoil of siege and other guns; and the object of the invention is to enable the work of running out or moving the gun to battery to be performed with less exertion than heretofore. These buffers enable the length of the platform to be reduced by about eight yards, and the exertion of running out the gun and placing the Scotch blocks or shoes under the wheels is entirely obviated. The last-mentioned operation is very fatiguing and involves considerable delay in firing; whereas with the employment of these hydraulic buffers the gun can be run out with the greatest ease and the firing is greatly accelerated.

In order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the annexed sheet of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 of the accompanying drawings represents an elevation of a gun-carriage, showing the improved buffer in elevation. Fig. 2 represents a vertical section taken through the vertical axis of the pivot on which the carriage moves horizontally, showing the masonry or béton in which the pivot is embedded and a view of the front part of the carriage and buffer. Fig. 3 shows the buffer in plan. Fig. 3<sup>a</sup> is a transverse sectional view, drawn to a larger scale, of the buffer-cylinder and piston-rod. Fig. 4 is a side elevation of a modification. Fig. 5 is a diagrammatic view showing the stiffener or connecting-beam in vertical section, and Fig. 6 is a plan view of the stiffener detached.

The gun-carriage can move horizontally about an upright.

The gun-carriage moves horizontally on a pivot C, of hammered or forged steel, embedded in a mass of solid béton, the upper surface of which is level with the working-platform. This mass or foundation of béton extends under the parapet or plongée in one direction and under the platform in the other, so that it is covered and supported on all sides in such a manner as not to be liable to be forced out of position by the strain of the recoil. This pivot is connected to a hydraulic buffer D, composed of a movable cylinder *f*, of forged steel, connected at one end to the trail of the gun-carriage by means of two connecting-rods *h*. In this brake-cylinder there is a piston attached to a rod *k*, working through both heads of the cylinder. One extremity of this rod is provided with an eye which engages loosely with the pivot C, between two pins *l* and *m*, which prevent the eye from shifting upward or downward on the pivot. This arrangement of the connection forms a species of universal joint, which gives the carriage B such freedom of vertical movement as to enable it to take any position in a vertical direction to which it may be moved by the discharge of the piece A. This is an arrangement that has not heretofore been provided, and, moreover, the trail is enabled to describe an arc of a circle having the pivot C as a center; or it may even describe a complete circle if the platform be constructed with this object and sufficient space is left between the pivot and the parapet. The employment of a piston-rod extending or projecting at both sides of the piston and of the same diameter through its length presents the important advantage of enabling the buffer-cylinder to be always maintained full of liquid when once charged.

Figs. 4 and 5 illustrate a modified arrangement, according to which the fixed vertical pivot is brought nearer to the axle-tree of the gun-carriage, being placed at C, under the said axle-tree. This arrangement affords great facility for the lateral adjustment of the gun.

The secure fixing of the vertical pivot may be effected by embedding it in masonry or by



supporting it by pieces of cast-iron connected to the platform in such a manner as to cause the weight and stability of the platform itself to co-operate in resisting the strain exerted by the buffer when the gun is discharged. Moreover, the front end of the piston-rod is free and the cylinder  $f$  is connected to the pivot  $C'$  by the intervention of two bent connecting-rods  $h'$ , provided at the forward ends with a hoop having journals engaging with the pivot, so as to form a universal joint. The other end of the piston-rod  $k$  is connected to the carriage either directly or by the intervention of a stiffener attached to the carriage, and hereinafter referred to. In this arrangement the piston moves when the recoil takes place and the cylinder remains stationary. The position of the pivot  $C'$  and the mode of bringing the buffer-cylinder to the said pivot enable the carriage to partake of all the vertical movements incidental to firing and to be adjusted or maneuvered horizontally to any desired extent.

As hereinbefore explained, the improved buffer is applicable to seige and other guns of any caliber.

The drawings represent a mode of jointing or connecting the piston-rod to the trail of the carriage, which is more particularly intended for heavy carriages; but in the case of carriages which are employed under such conditions that certain of the parts are worked up to near the limit of their power of resistance when the gun is discharged without a buffer it is advisable to strengthen it before attaching the buffer—that is to say, to so arrange the point of connection of the latter as to avoid any increase of strain on the weak points and to utilize only those parts of the carriage or mounting that have been proved by practice in firing to possess a certain surplus of strength. This method of strengthening the mounting is illustrated in Figs. 4, 5, and 6. A beam or stiffener  $F$  is firmly fixed to the carriage, and at the forward end  $g'$  is bolted to the cheeks and to the plate or block covering the axle-body, the rear end  $g$  being connected to the transom-plate carrying the lunette or pintle-socket in the trail. The buffer is attached to the beam  $F$  and is nearer to  $g$  than to  $g'$ , in place of being connected to the cheeks. By these means the initial stiffness of the carriage from the axle-plate to the lunette is increased by the stiffness of the beam  $F$ , and the latter possesses a power of resisting flexion which is greater than the force exerted in this direction by the buffer during the recoil.

The compressing-strain on the stiffener is transferred or distributed over the whole of the parts connected to the axle, which present a surplus of strength far greater than that required to resist the supplementary strain thrown upon them by the application of the buffer.

In the example illustrated the stiffener  $F$

(shown detached in Fig. 6) is composed of two plates of rolled steel connected at their forward extremities by a transom-plate and two angle-irons and provided internally with two riveted sheaths recessed or cut away according to the custom of the lower frames of the cheeks and of the vertical wings of the internal supporting-plates of the axle-body. In this particular case the connecting beam or stiffener is fixed to the mounting or carriage without any modification in the construction of the latter. The carriage is connected to the limber in precisely the same way as when no stiffener-beam is employed, the pintle of the limber being substituted for the ball or pivot working in the lunette or hole for the reception of the pintle.

It is evident that the stiffener  $F$  may be forged or cast or made in any other suitable form, in place of that illustrated in the drawings, which is merely given as an example of the means that may be employed to increase the strength of certain carriages, and merely to show that the hydraulic buffer is applicable to carriages for guns of any caliber.

An arrangement hereinafter described enables the same buffer to be applied to carriages for guns of different calibers. This arrangement consists in forming through the buffer-piston more holes than are necessary to limit or retard the recoil of a heavy gun—four, five, or more holes, for example—and stopping up those holes that are not required.

In order to use the buffer for smaller guns it is sufficient to stop up one or more of the holes in the piston, and vice versa.

I claim as my invention—

1. The combination of a gun-carriage and an upright pivot fixed in the foundation and about which the carriage can move in a horizontal plane, with a buffer-cylinder and a piston, one connected to the carriage and the other to the fixed pivot, and the piston having a rod passing through the opposite ends of the cylinder, all substantially as described.

2. The combination of a gun-carriage and a fixed pivot therefor with a buffer-cylinder and a piston, one connected to the carriage and the other universally jointed to the pivot, the said piston having a rod passing through opposite ends of the cylinder, all substantially as described.

3. The combination of a gun-carriage and a pivot therefor with a buffer-cylinder connected to the said carriage and a piston having a rod passing through opposite ends of the cylinder and connected to the pivot, all substantially as described.

4. The combination of a gun-carriage and a fixed pivot therefor with a buffer-cylinder and a piston, one connected to the carriage and the other universally jointed to the pivot, substantially as described.

5. The combination of a gun-carriage and a pivot therefor with a piston and a rod universally jointed to the pivot, a buffer-cylind-

der in which the piston works, and cheeks connecting the cylinder with the carriage, all substantially as set forth.

5 6. The combination of a gun-carriage having a beam or stiffener F connected at one end to the trail and at the other to the body of the carriage, with a fixed pivot for the carriage and a buffer-cylinder and piston, one connected to the pivot and the other to the

beam or stiffener, all substantially as specified.

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

PIERRE LOUIS ADRIEN DE MONTGOLFIER.

Witnesses:

JEAN BAPTISTE KIROLIER,  
JEAN GAUTHER.