

(No Model.)

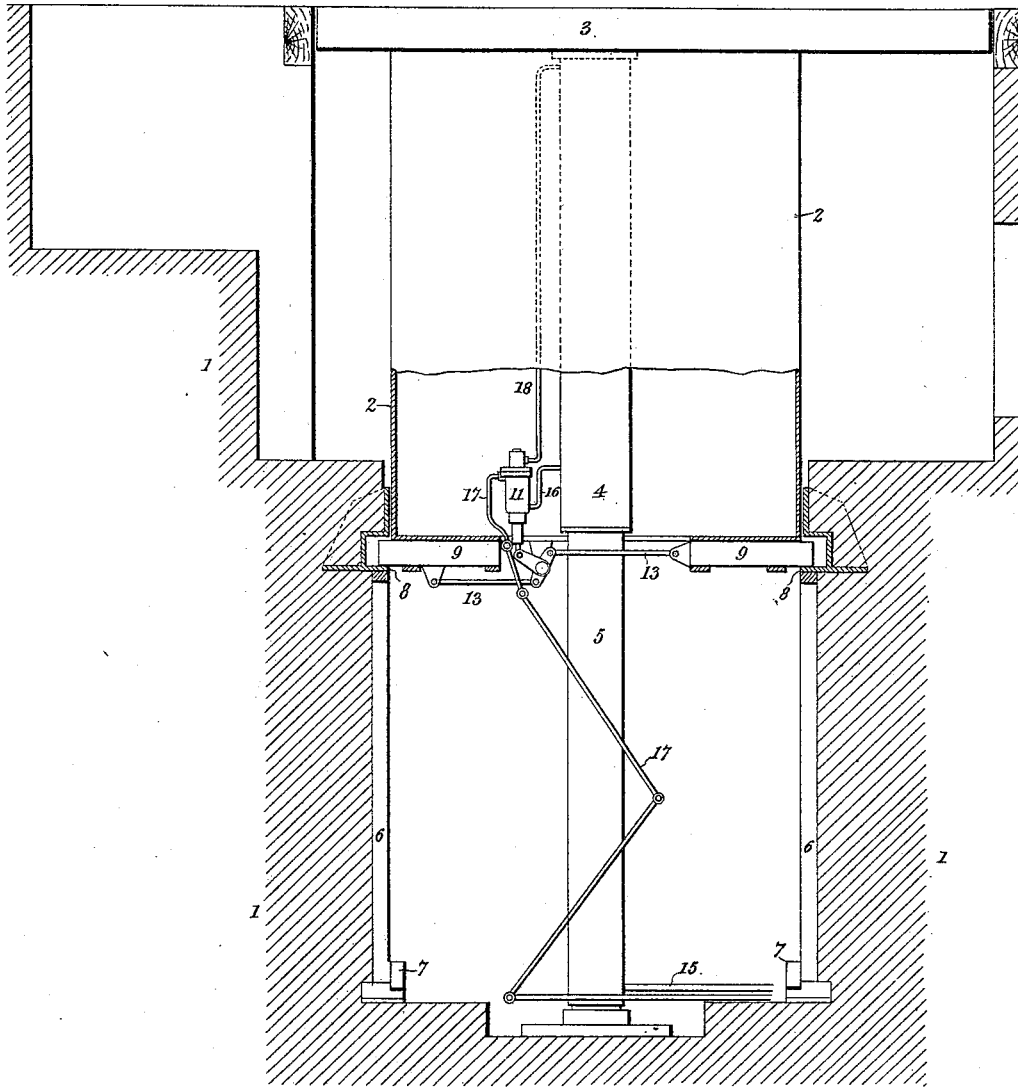
2 Sheets—Sheet 1

T. F. ROWLAND.
HYDRAULIC ELEVATING MECHANISM.

No. 493,301.

Patented Mar. 14, 1893.

Fig. 1



WITNESSES:

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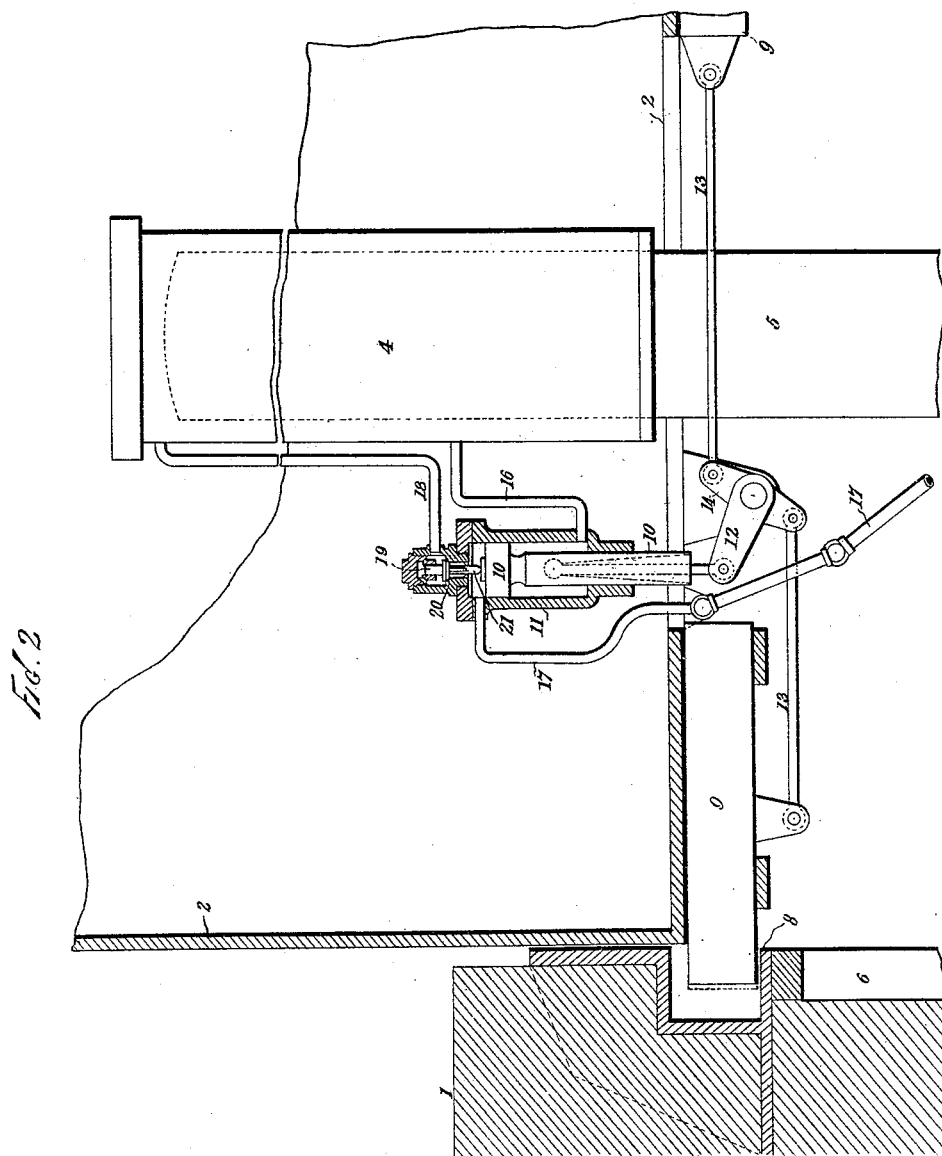
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UNITED STATES PATENT OFFICE.

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HYDRAULIC ELEVATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 493,301, dated March 14, 1893.

Application filed November 11, 1892. Serial No. 451,704. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. ROWLAND, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Hydraulic Elevating Mechanism, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The present invention relates generally to hydraulic machinery for raising and lowering an elevator, lift or like structure.

The invention is herein shown and described as applied to a vertically operated gun lift, that is, to a structure designed to support a gun and its carriage, and to carry the same up to the top of the lift pit, to position of firing over a parapet or other like protective structure or walls, and to lower the same to below the protective walls or to the position of loading, and such a lift, as herein contemplated, is illustrated and described in United States Patent No. 488,838, issued to me December 27, 1892. In this patent are shown a gun lift, a hydraulic cylinder and ram for elevating the lift, and bolts on the lift which are operated by hydraulic pressure to engage landings in the walls of the lift pit and thereby support the lift and its load on such landings. The supporting bolts are subjected to a pressure so applied that, when they come opposite the landings in the pit walls, they will be at once shot out over such landings, preparatory to engaging or resting upon the same. After the bolts have been thus projected, the lift is stopped, its lifting pressure withdrawn, and it is thereby slightly lowered and comes to rest with its bolts upon the landings, such landings acting to entirely support the lift and its load, the lifting cylinder being wholly freed of the weight of the lift and of the internal, hydraulic or lifting pressure. In the case of a gun lift, it is essential that the elevating mechanism be thus freed of load and internal pressure, to guard against it being injured by the shock of the discharge of the gun. After the gun is discharged, the lift will be raised from the landings upon which it rests, the lift-supporting bolts will be withdrawn and the lifts lowered,

all as fully set forth in my said application for patent.

It will now be understood that, with a gun lift, it is highly essential that the gun carried thereon be exposed above the parapet for as short a time as practicable, and to this end it is necessary that the lift when at its upper limit of travel be brought to rest upon its supporting landings as quickly as possible. Furthermore, it is desirable to provide means that shall act automatically to prevent the lift being run up too high, as in case of negligence on the part of or disability of the person in charge and control of the hydraulic elevating machinery and its source of power, as also to insure the withdrawal of the hydraulic pressure from the lifting mechanism and the safe landing of the lift in the firing position before the gun be discharged.

Accordingly, the object of the present invention is to provide means whereby the lift, as it arrives at the limit of its upward movement, will be surely and quickly landed, and the lifting pressure be withdrawn from the elevating mechanism, which landing of the lift is to be produced by automatic devices acting independently of the will of the lift operator.

The invention will be described in connection with the accompanying drawings, and in the claims to follow, I shall point out what is claimed as new.

In the drawings, Figure 1 is a vertical section through the walls of a gun lift pit, and through the lift, which lift is provided with hydraulic bolt-operating mechanism embodying my invention. In this view the lift is shown at its highest, or the firing position, and it is supported by its bolts upon the upper landings. Fig. 2 is an enlarged detail sectional view of a part of the lift, the bolt-operating cylinder being also in section. In this view the lift is shown as having been raised to opposite the upper landings, and as being still supported by the elevating pressure, and the bolts are shown as projected over the landings but not quite to their full extent of outward travel.

Referring to the views in detail, 1 represents the walls of the lift pit; 2, the lift; 3, 100

the lift platform, upon which it is to be understood the gun and gun carriage are to be carried; 4, the lifting cylinder, which is in any suitable manner secured rigidly to the lift; 5 and 5, is the lifting ram or plunger.

6 represents stanchions secured in or on the face of the walls of the pit, and which rest upon the lower landings 7, and support at their upper ends the upper landings 8, which are in the form of shelf bracket sockets embedded in and strongly anchored to the walls of the pit.

9 represents the bolts, usually four in number, that are carried on the lift, these being projected by the upward movement of the piston 10 in the cylinder 11, which piston is pivotally attached to the crank arm 12, to which in turn are attached the bolt rods 13 through the medium of the lever arm 14.

The pipe 15 supplies the ram with water under suitable pressure, and serves also as an exhaust to draw off the water. The pipe 16 conducts water from the lifting cylinder 4 to below the piston 10 of the bolt operating cylinder, the lower face of such piston being of smaller area than its upper face. The flexibly jointed pipe 17 conducts water to above the bolt-operating piston; it being understood that this pipe and the pipe 15 are connected with a common source of water under high pressure—usually hydraulic accumulators.

Pipe 18 connects the top of the lift cylinder with the top of the bolt cylinder, the valve 19 being interposed and closing, by gravity movement and under the pressure of the water in the lifting cylinder, the valve seat 20. The stem 21 of this valve is winged as shown to permit the passage of water, and it extends, when the valve is seated, such a distance into the bolt cylinder that just before the bolt piston comes to rest at the upper end of its cylinder the piston will strike this stem and so raise the valve off its seat.

When it is desired to raise the lift from its lowermost position where its bolts support it on the lower landings, the hydraulic pressure will be applied within the elevating cylinder, and the lift thereby run up. The application of this pressure tends also to raise the bolt piston, which, it should be understood, is to be considered as now at the lower end of its cylinder; but the outer ends of these bolts when withdrawn are just within the faces of the stanchions, and therefore the elevating pressure acts on these bolts while the lift is below its upper landings to only press them against the stanchions and thus to steady and guide the lift as it ascends. This pressure on the bolt piston being maintained during the ascent of the lift, it will be seen that so soon as the bolts pass the upper landings, the bolt piston is free to rise to the top of its cylinder and so project the bolts out over the landings. But the final motion of this piston lifts the valve 19, and thereby opens the pipe 18 to the pipe 17, which latter pipe being open at

this time to exhaust, the water pressure in the lift cylinder is at once relieved and the lift settles down and comes to rest upon the bolts, now projecting over the upper landings. As pipe 18 taps the lift cylinder at its top, only a small quantity of the water in the cylinder will escape therefrom, that is, only such quantity, approximately, as will insure the absence of any pressure in the lift cylinder other than that due to the weight of the contained water.

When it is desired to lower the lift, water under pressure will be supplied to pipe 17. This supply will restore the pressure in the lift cylinder, and so cause the lift to be raised and the bolts to be lifted free from contact with the upper landings. If desired the restoration of pressure in the lift cylinder may take place wholly through pipe 15, the pipe 17 being meanwhile closed; or the pressure may be effected through both of these pipes at the same time. So soon as the lift is raised and the bolts are freed from the landings, the pressure on the upper face of the bolt piston overcomes that on the lower face of the same, by reason of the difference in their areas, and this piston is forced downwardly and thereby withdraws the bolts from their extended position. The pressure in the elevating cylinder is now reduced, the exhaust of the water preferably being effected through the pipe 15, and the lift is lowered. So soon as the bolts come to oppose the vertical faces of the stanchions, the pipe 17 is put to exhaust and the pressure above the bolt piston removed; whereupon the valve 19 is closed, by the pressure in the lift cylinder, which pressure is maintained by the weight of the descending lift, and the bolts are projected, by the pressure under the bolt piston, to bear against the faces of the stanchions and so steady and guide the lift during its descent.

What is claimed as new is—

1. The combination with an elevator or lift, its side or pit walls, and hydraulic elevating mechanism therefor, of hydraulic bolt mechanism carried on the lift and adapted to engage the pit walls and support the lift thereon, and an exhaust outlet to the elevating mechanism provided with a valve adapted to be operated to open said exhaust by the bolt mechanism as the bolts of the same are projected to engage the pit walls.

2. In combination, an elevator or lift and the side or pit walls thereof, a hydraulic cylinder and piston for raising and lowering the same, an exhaust outlet to the said cylinder provided with a valve acting normally to hold the exhaust closed, and hydraulic mechanism separate from the elevating mechanism and operated by the lifting pressure to open said valve when the lift has arrived at a predetermined height.

3. In combination, an elevator or lift and the side or pit walls thereof provided with landings for the lift to rest upon, a hydraulic

cylinder and piston for raising and lowering the lift, hydraulic bolt-mechanism carried on the lift and adapted to engage the wall landings, an exhaust outlet to the elevating cylinder which is provided with a valve normally holding the same closed and adapted to be operated to open the exhaust by the bolt-operating mechanism as the bolts are projected to engage the landings.

10 4. In combination, an elevator or lift and the side or pit walls thereof provided with landings for the lift to rest upon, a hydraulic cylinder and piston for elevating and lowering the lift, bolt mechanism carried on the lift and for engaging the said landings, a hydraulic piston and cylinder for operating the bolt-mechanism, and an exhaust outlet to the elevating cylinder provided with a valve adapted to be opened by the bolt piston as

the same projects the lift-supporting bolts to position for engagement with the lift landings.

5. In combination, an elevator or lift and the side or pit walls thereof provided with landings for the lift to rest upon, a hydraulic cylinder and piston for elevating and lowering the lift, bolt mechanism carried on the lift and for engaging the landings, a hydraulic piston and cylinder for operating the bolt-mechanism and deriving operative pressure from the elevating cylinder, and an exhaust outlet to the elevating cylinder provided with a valve adapted to be opened by the bolt piston as the bolts are projected to position for engagement with the lift landings.

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Witnesses:

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