(No Model.) 2 Sheets—Sheet 1.

T. F. ROWLAND.

HYDRAULIC ELEVATING MACHINERY.

No. 488,837. Patented Dec. 27, 1892.

Fig. 1

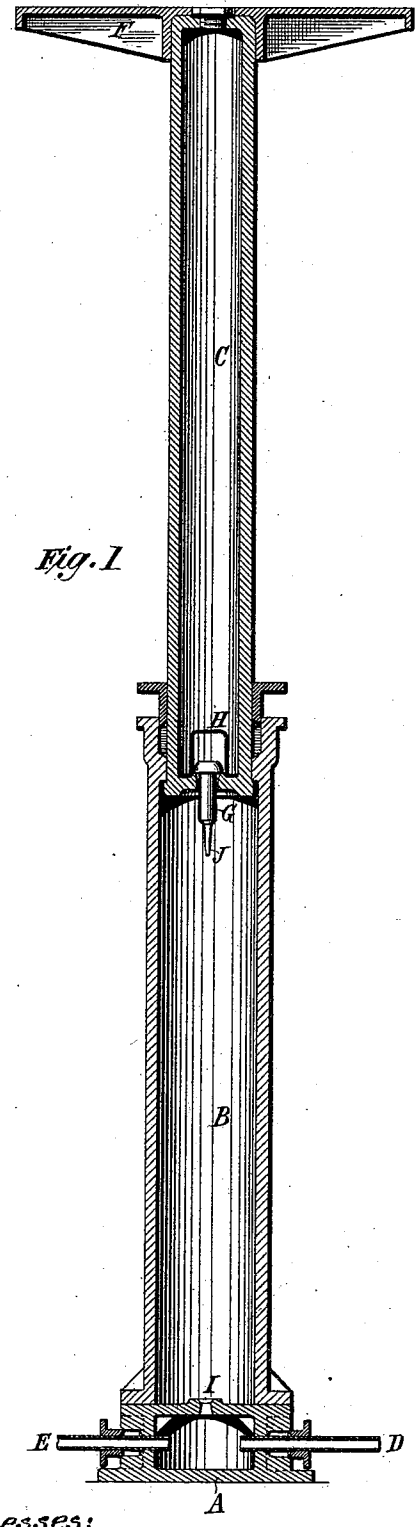


Fig. 3

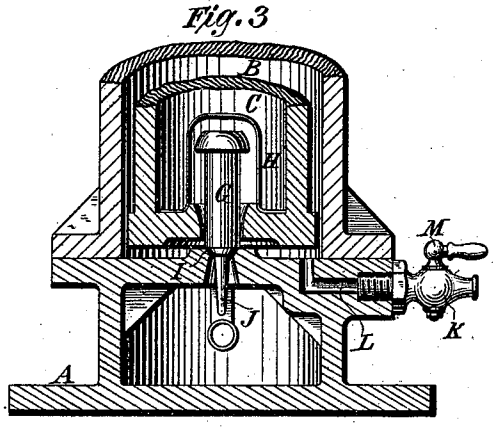
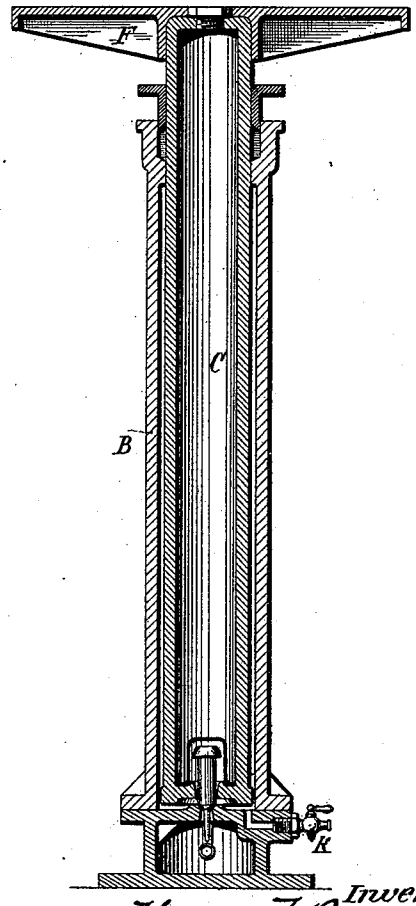


Fig. 2



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

T. F. ROWLAND.

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Fig. 4

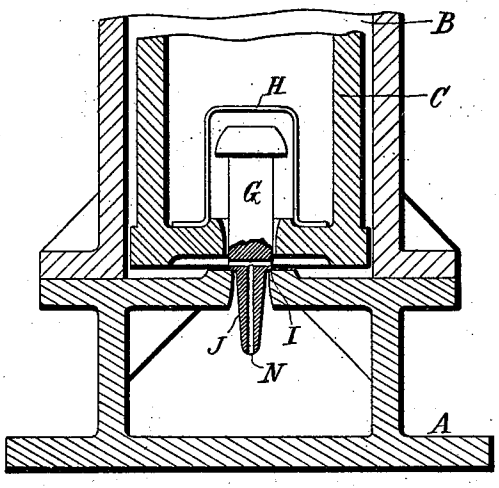


Fig. 5

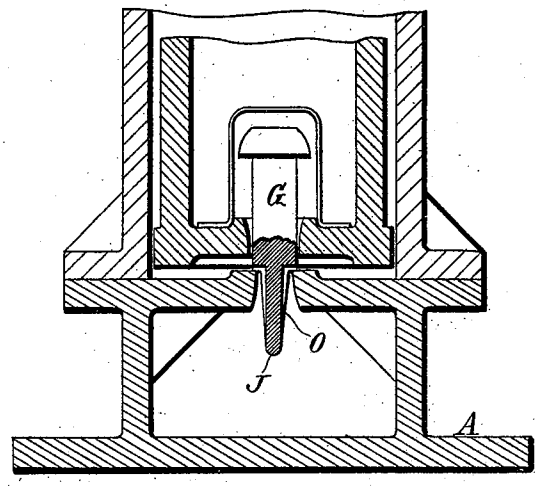


Fig. 6

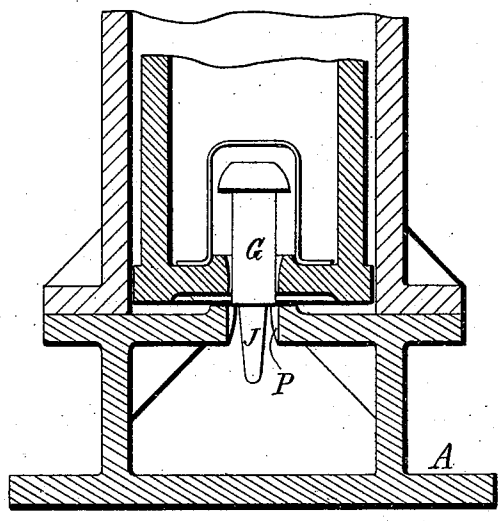


Fig. 7

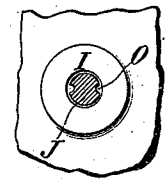
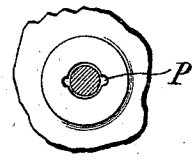


Fig. 8



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UNITED STATES PATENT OFFICE.

THOMAS F. ROWLAND, OF NEW YORK, N. Y.

HYDRAULIC ELEVATING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 488,837, dated December 27, 1892.

Application filed May 23, 1892. Serial No. 434,089. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. ROWLAND, of the city, county, and State of New York, have invented certain new and useful Improvements in Hydraulic Elevating Machinery, of which the following is a specification, reference being had to the accompanying drawings.

The present invention relates to that class of hydraulic machinery employed for raising and lowering loads or weights of various kinds, and which consists of a ram, plunger or piston and a cylinder, which piston and cylinder are arranged telescopically and one of these members having motion along or on the other to raise and lower loads mounted on such movable member.

The object of the invention is to provide improved means whereby the traveling member, especially when loaded, can be easily landed or brought to rest without injury to the machine, particularly in event of the rupture of the connecting pipes, or the occurrence of such breaks or derangement of the parts as would permit the fluid between the piston and cylinder to have uncontrolled escape.

The invention consists, in combination with a hydraulic cylinder and piston, of a valve disconnectedly hung on the moving member, a valve seat on the stationary member in line with the said valve, the valve and valve seat being so constructed and arranged that when the piston descends the valve will enter the seat and trap between the two members a portion of the fluid contained in the cylinder, and of a duct, channel or equivalent means whereby the fluid so trapped between the piston and cylinder will be permitted to slowly escape, so that, after the moving member has been retarded or checked by the trapped body of fluid it will be gradually brought to rest at the limit of its downward movement and without striking the parts upon which it comes to rest a violent or sudden blow or otherwise injuring the same. In a pending application for patent Serial No. 398,756 filed July 8, 1891, I have described one form of such valve mechanism. The present application embodies improvements on the disconnectedly hung valve mechanism not described and claimed in said application.

The form of mechanism selected to illustrate the application of the present improvements is a hydraulic accumulator, but it is to be understood that the improvements are applicable to many other forms of elevators, lifts, rams, &c.

Referring to the drawings illustrating the invention: Figure 1 is a central vertical section of the cylinder and piston of a hydraulic ram, the parts being shown in their extended position or at the limit of their upward vertical movement. Fig. 2 shows the same parts in similar section on a plane at right-angles to the plane of the section of Fig. 1, the piston or moving member being at its lower limit of vertical movement. Fig. 3 is an enlarged detail cross-section of the valve parts as shown in Fig. 2. Figs. 4 to 8 are sectional views illustrating modified forms of the valve parts.

Referring to the views in detail, A represents the base of the apparatus; B the hollow cylinder fixedly attached to the base; C a piston or plunger working vertically in the cylinder.

D is an inlet pipe to the cylinder.

E is an outlet pipe therefrom; and F is the platform on the piston upon which is mounted the load to be raised vertically.

G is a headed plug valve which is carried in a bearing in the lower end of the piston C.

H is a cage loosely surrounding the valve and adapted to prevent the valve from being lifted out of the opening in which it is hung.

I is the valve seat located centrally in the partition or lower wall of the cylinder and being in line with the valve G. Preferably the valve has a plug point J which serves to guide it into its seat; and in this construction of the valve its spindle portion is constructed to fit accurately and tightly in the valve seat to entirely close the same.

K is a cock which connects by the duct or passage L to within the cylinder at one side of the valve seat. This cock is provided with a suitable valve M adapted to increase or diminish the opening through the valve.

It will now be plain, that as the piston descends and the lower end of the same approaches the lower end of the cylinder the valve plug will enter the valve seat and gradually cut off the flow of fluid through the

same, until the valve spindle enters the seat and fully closes the same. Thus, the flow of water from between the piston and cylinder is gradually checked and finally entirely stopped—except of course for such light leakage as may occur through the joints between the piston and cylinder. This causes the piston to be gradually retarded and nearly brought to rest.

It being understood that the cock K has been left slightly open, it will now be seen that the water trapped between the piston and cylinder will gradually escape through this cock, until the piston comes slowly and gradually to contact and finally rests upon the cylinder. In case the descent of the piston has been caused by the uncontrolled escape of the water from below the cylinder, it will be seen that these means are an efficient guard or protection to prevent the piston landing on the cylinder with such shock or blow as to injure the apparatus.

In Fig. 4 I show the valve disconnectedly hung on the moving member as having the central perforation N extending through the valve plug J to above the valve seat, when the valve is in the seat, and then laterally through the spindle and cylinder. In this case the final, escape of water from between the piston and cylinder will be through the perforation N, which, having a definite size, will effect the landing of the piston regularly and at predetermined times.

In Fig. 5 I show the valve plug J as scored or grooved at O along its length from below the valve seat, and laterally above the valve seat to the space between the cylinder and piston.

Fig. 7 illustrates a plan view of this valve seat with the piston therein, and sectioned on the line where the plug joins the piston. The action with this construction is substantially the same as in the case of the other forms of valve mechanism.

In Fig. 6 I show a valve seat as being scored or grooved at P, seen also in Fig. 8, which is a plan of the valve seat and a cross-section of the valve plug.

In these various forms shown and described the action is substantially the same. After the piston has been arrested or retarded by the gradual cutting off of the flow of water by the valve plug and valve, the further descent of the piston is gradually and easily continued by the slow escape of the trapped water through the channel or channels especially provided therefor. In practice it is preferred to use the construction shown in Figs. 4 to 8.

What is claimed as new is:

1. In combination, a hydraulic cylinder and the plunger or piston thereof, a valve disconnectedly carried on the piston or moving member, an open valve seat on the cylinder or stationary member arranged in line with the valve, whereby as the piston descends within the cylinder a body of fluid is confined between them, and a duct or channel adapted to permit the slow escape of the trapped water from between the plunger and piston and thereby cause the plunger to come gradually to rest without shock.

2. In combination, with a hydraulic cylinder and the plunger thereof, a valve disconnectedly carried on the moving member, an open valve seat on the stationary member in line with the valve and a port or passage to establish communication between the space above the valve seat and the space below the same when the valve is closed, substantially as and for the purpose set forth.

3. In combination with a hydraulic cylinder and the plunger thereof, a valve disconnectedly carried on the moving member, an open valve seat on the stationary member arranged in line with the said valve, the said valve being provided with a duct or passage adapted to permit the slow escape of water by the same after being seated in the valve seat, substantially as and for the purpose set forth.

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