H. FLAD.

DUMB WAITER FOR CAISSONS.

No. 109,505. Patented Nov. 22, 1870.

Fig. 1.

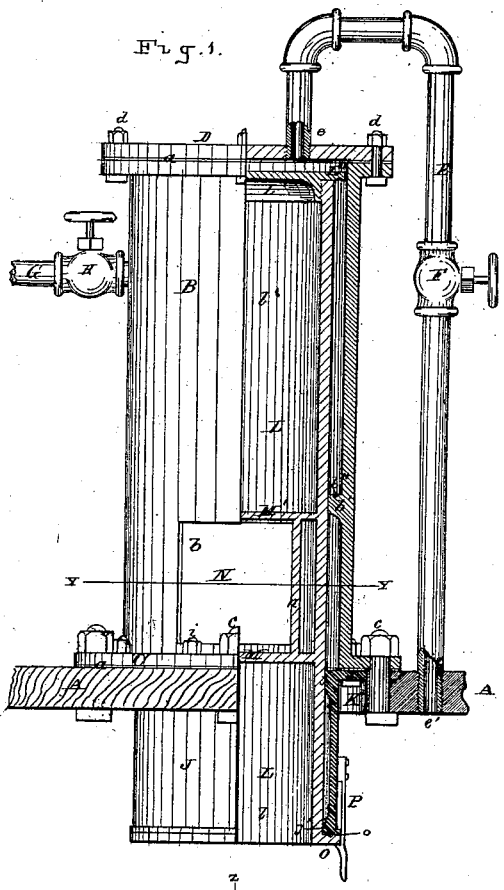


Fig. 2.

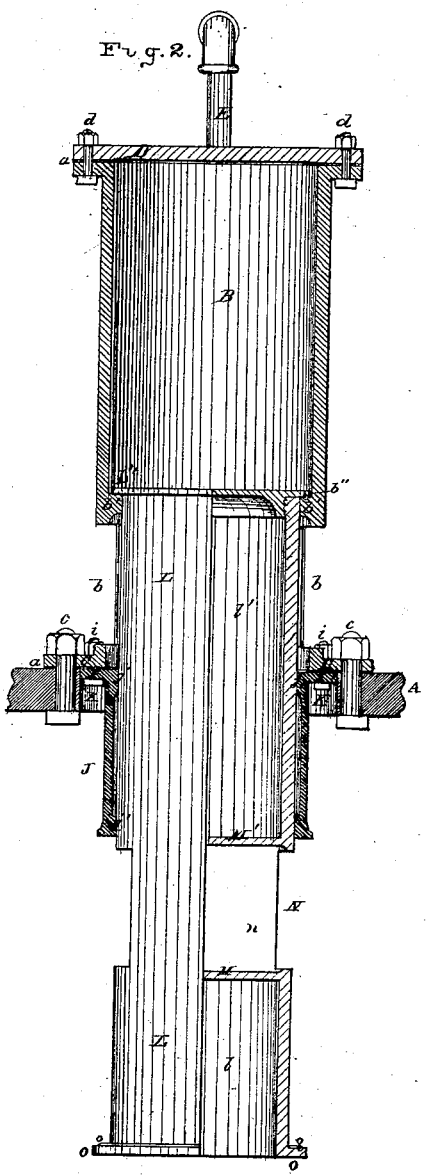
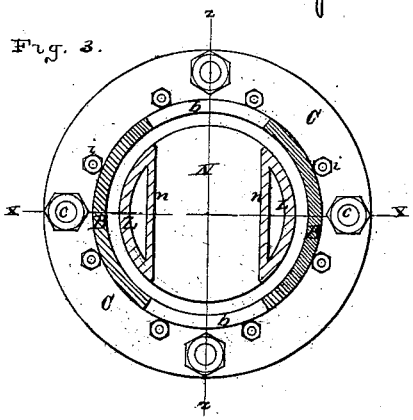


Fig. 3.



Witnesses.
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HENRY FLAD, OF ST. LOUIS, MISSOURI.

Letters Patent No. 109,505, dated November 22, 1870.

IMPROVEMENT IN DUMB-WAITERS FOR CAISSONS.

The Schedule referred to in these Letters Patent and making part of the same.

I, HENRY FLAD, of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and useful Dumb-Waiter for use in Caissons for sinking piers; of which the following is a specification.

Nature and Object of the Invention.

My dumb-waiter consists of two cylinders, one of which is fixed to the top of the air-chamber and extends vertically through the same. This cylinder is open at bottom and contains the other cylinder, which has vertical movement therein in the manner of a plunger.

The inner cylinder has two horizontal diaphragms, forming a chamber at about its mid-length, the said chamber being open at the opposite sides, the outer cylinder having openings agreeing with those of the inner one when the latter is in its upper position.

The interior cylinder works air-tight in the outer one, either by interior collars of the latter which are made to fit the former, or by means of any suitable packing, such as leather, hemp, or rubber.

The object of my invention is the conveyance of material from outside into the working or air-chamber of the caisson, or *vice versa*, without the tedious process heretofore employed in the use of air-locks.

My dumb-waiter operates by the weight of the material, or by the pressure of air, without requiring any special machinery.

Figure 1 shows my dumb-waiter partly in elevation and partly in section at the line X X, fig. 2, the inner cylinder being in its upper position.

Figure 2 is a horizontal section at the line Y Y, fig. 1.

Figure 3 shows half the inner cylinder in side view, and the other half of this cylinder with the outer cylinder, in section at the line *z z*, fig. 2, the inner cylinder being in its lower position.

A is the top of the air chamber of a caisson for sinking piers of bridges, &c.

B is a cylinder secured to the top of A by means of a flange, C, and bolts, *c*. This cylinder has a head, D, secured by bolts, *d*.

a a are India-rubber or other gaskets.

Passing through the head D is the upper end *e* of an air-pipe, E, the lower end *e'* of the pipe passing through the top A of the main air-chamber of the caisson. This pipe forms a connection between the said air-chamber and the upper part of the cylinder B.

The pipe E has a valve or cock, F, by which it may be wholly or partially closed.

G is a waste-pipe communicating with the inside of the cylinder B and with the outer air. This pipe has a valve or cock, H, by which it may be closed or opened, more or less.

Attached to the lower side of the flange C (of the cylinder B) by bolts, *i*, passing through the flanges C and I, is a cylinder, J, forming a downward continuation of the cylinder B, and extending through a circular opening, K, in the top of the air-chamber.

L is the inner cylinder, which has vertical movement in the outer cylinder by means of the pressure of air above and beneath it.

The cylinder L has two horizontal diaphragms, M and M', dividing it into three compartments, the lower one, *l*, of which is open at bottom. The upper compartment *l'* is closed by a head, L', which may be removed to allow the placing within the compartment of a weight to act as a partial counterbalance to the pressure of air beneath the cylinder.

The middle compartment N has side plates, *n*, extending from one diaphragm to the other, and giving the said compartment a rectangular form. This compartment is open at one or both of the sides, to admit the materials to be conveyed from the outside to the inside of the air-chamber, or *vice versa*.

The outer cylinder B has also one or more openings, *b*, which allow communication with the compartment N when the cylinder L is in its upper position, as in fig. 1.

In constructing the cylinder L, its outside is carefully turned, and preferably drawfiled so as to have a smooth surface, and equal diameter from end to end, and it is made to accurately fit the interior circumferential rib *b'* of the cylinder B and ribs *j j'* of the cylinder J, so that there will be little or no escape of air between the cylinder L and the ribs, the inner face of the latter being carefully prepared.

In place of the ribs *b'*, *j*, and *j'*, may be substituted a packing of leather, hemp, rubber, or other substance, with means of moistening or lubricating the same, so as to make an air-tight joint, and allow the easy movement of the cylinder.

The head L' of the cylinder L extends outward beyond the cylinder, forming a flange, L'', which, when the cylinder is in its lower position, rests upon a rubber gasket or packing, *b''*, upon the top of the rib *b'*; and the lower end of the cylinder L has an out-turned flange, O, upon which is a packing-ring of rubber, *o*, that, when the cylinder rises to its upper position, is brought in contact with the cylinder J, the rubber packings making an air-tight joint when the cylinder is at rest in either its upper or lower position.

P is a spring catch, whose claw takes beneath the end of the cylinder L when the latter is in its upper position, and sustains the cylinder while loading; and a catch or chock would be provided to hold the cylinder in its lower position. The weight of the load is generally sufficient to cause the cylinder to descend, and on

the removal of the load the pressure of air beneath overcomes the weight of the cylinder and causes it to rise to the upper position.

The construction of the caisson to which my dumb-waiter is an accompaniment is not described, as its provisions are well known to the profession. It consists substantially of a structure having a top agreeing in area with the base of the pier, and sides resting upon the ground, there being no bottom, and the water and mud being kept out by a sufficient pressure of air.

The operation of the dumb-waiter is as follows:

Supposing the moving cylinder L to be in its upper position, and the valve or cock F closed, the heads of both cylinders B and L may be removed, and the inner cylinder loaded by placing stones or any heavy matter in the upper compartment so that the weight of the cylinder when loaded may approximate to the upward pressure of air beneath it. The heads of the cylinders are then secured in their places. A load of concrete or other material is placed in the compartment N, and the catch P drawn outward so as to permit the loaded cylinder to descend. If the weight of the load is not sufficient to cause the descent of the cylinder, the valve H of the waste-pipe is closed, and the valve F somewhat opened to admit a quantity of compressed air into the top of the cylinder B. The top-pressure, in addition to the weight, will then carry the cylinder downward until the flange L″ rests upon the packing-gasket *b″*. The compartment N will then be within the main air-chamber, and the load may be removed, which will so lighten the cylinder that the pressure of air beneath it will force it upward ready for a fresh load. If the friction of the cylinder is so great as to prevent its rising, the valve H is opened to allow the escape of a portion of the compressed air from above the inner cylinder, and the latter will then rise.

In removing matter from the air-chamber, said matter is placed in the compartment N when the cylinder is in its lower position, and the cock or valve H being opened, and that F closed, the pressure of air beneath the cylinder will force it upward. The cock or valve H is then closed, and the matter removed from the compartment. The valve F is then opened sufficiently to cause the descent of the cylinder for another load.

Claim.

1. A cylinder or conveyer of other form, having vertical movement in a closely-inclosing cylinder or case with means of operating or balancing the conveyer by compressed air to enable material to be removed from or carried into the working or air-chamber of the caisson, in manner substantially as described.

2. The cylinder L, having a cavity, N, for reception of matter to be carried into or out of the air-chamber, the inclosing-cylinder B J attached to the top A of the air-chamber, and having the interior collars or rings *b′ j j′* or other packing to check or prevent the escape of air, and the pipes E G communicating with the upper part of the fixed cylinder and with the air-chamber and outer air, respectively, each substantially as described.

In testimony of which invention I hereunto set my hand.

HENRY FLAD.

Witnesses:
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