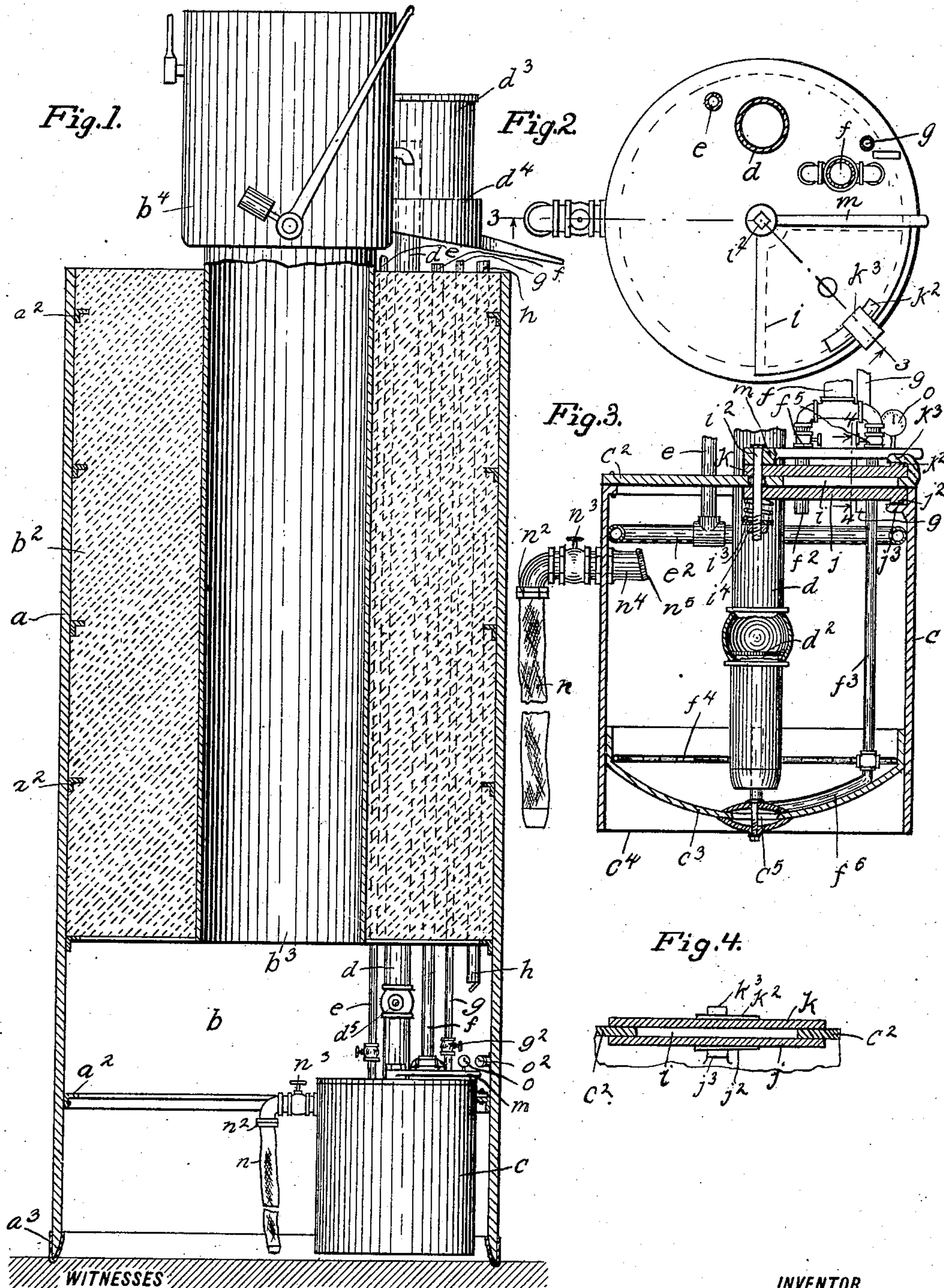


No. 876,827.

PATENTED JAN. 14, 1908.

A. Z. McLEOD.
CAISSON CONSTRUCTION.
APPLICATION FILED APR. 16, 1907.



WITNESSES

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CAISSON CONSTRUCTION.

No. 876,827.

Specification of Letters Patent.

Patented Jan. 14, 1908.

Application filed April 16, 1907. Serial No. 368,571.

To all whom it may concern:

Be it known that I, ALEXANDER Z. McLEOD, a subject of the King of Great Britain, and residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Caisson Constructions, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to caissons for use in sinking the foundations of bridges, piers and other structures; and the object thereof is to provide an improved device of this class which is simple in construction and operation and which is an improvement on that described and claimed in an application for Letters Patent of the United States filed by me December 27, 1906, Serial Number 349,642.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which;—

Figure 1 is a sectional side elevation of a caisson constructed according to this invention; Fig. 2 a plan view of a hopper or receptacle which is placed in the working chamber of the caisson and showing pipes connected therewith in section; Fig. 3 a sectional side elevation of the hopper or receptacle shown in Fig. 2, the line of the section being indicated at 3—3 of Fig. 2; and, Fig. 4 a partial section on the line 4—4 of Fig. 3.

In the practice of my invention, I provide a caisson casing *a* which may be either rectangular or circular in cross section, or of any other preferred form, and composed of heavy boards bolted to or otherwise connected with angle irons *a*² in the usual manner, and the bottom of which is preferably provided with a metal covering *a*³ which is V-shaped in cross section so as to facilitate the passage of the bottom of the caisson downwardly through earthy material in the operation of sinking a pier, foundation, column or similar construction.

In the bottom of the caisson is a working chamber *b* above which said caisson is filled in with concrete as shown at *b*², and in the concrete *b*² is a central vertical passage *b*³ which is intended for the usual purpose of lowering material into the working chamber *b* or raising material therefrom, and as a passage for workmen to and from said working cham-

ber, and it will be understood that, in practice, the usual lowering and hoisting apparatus is employed, and above the caisson is placed the usual air lock *b*⁴, but said air lock and the details thereof form no part of this invention. Within the working chamber *b* is placed a hopper or other receptacle *c* having a cover *c*² and a raised bottom *c*³ which, in the form of construction shown, is concavo-convex in cross section, and around the bottom *c*³, the hopper or receptacle is provided with a depending flange or rim *c*⁴ which preferably extends below the bottom *c*³, and said bottom *c*³ is provided centrally with a man-hole or hand-hole which is closed in the usual manner as shown at *c*⁵ and which is adapted to be opened and closed from the outside or from beneath the bottom *c*³.

Extending downwardly through the caisson, and preferably through the concrete in the top part thereof is a stand pipe *d*, the lower end of which extends downwardly into and near the bottom of the hopper or receptacle *c*, and said stand pipe is provided within the hopper or receptacle with a valve *d*² adapted to open upwardly and the upper end of the stand pipe *d* which extends above the caisson opens into a hood *d*³, the lower end of which communicates with a discharge spout *d*⁴ as in my prior application hereinbefore referred to. A water pipe *e* also extends vertically through the caisson and into the hopper or receptacle *c* and is provided within said hopper or receptacle with a water distributor *e*², preferably consisting of a perforated pipe connected therewith. A high pressure air pipe *f* also extends vertically through the caisson and the lower end thereof is branched in the working chamber *b*, and one branch *f*² passes into the top portion of the hopper or receptacle *c* and the other branch *f*³ passes through the top portion of the hopper or receptacle, and extends downwardly into the bottom portion thereof, and is connected with a distributing pipe *f*⁴, and the branches *f*² and *f*³ of the pipe *f* are provided above the hopper or receptacle with valves *f*⁵. An air exhaust pipe *g* also extends vertically through the caisson and into the hopper or receptacle and passes through the top of said receptacle, in the form of construction shown, and said air exhaust pipe is provided with a valve *g*² above said hopper or receptacle, and a low air supply pipe *h* extends vertically through the caisson and communicates with the working chamber *b*.

The object of the man-hole or hand-hole in the bottom c^3 of the hopper or receptacle is to provide means for removing stone or other hard substances from the bottom of the stand pipe, if the latter should become clogged thereby, in the operation of the apparatus as hereinafter described, and the object of the branch pipe f^3 of the high pressure pipe f is to supply air under pressure to the material in the hopper or receptacle so as to loosen it up and the branch pipe f^3 supplies air to the top of said material and serves to force it out through the stand pipe d , while the water pipe e supplies water under pressure to the material in the hopper or receptacle and aids in loosening up said material and forming it into a solution which may be forced out through the stand pipe in which operation the air supplied through the high pressure pipe f is the chief agent.

The air exhaust pipe g is intended for use in exhausting air from the hopper or receptacle c between each operation of filling and emptying said hopper so as to permit new material to be placed therein, in which operation the exhaust pipe g is opened and the high pressure air pipe f closed, and in this operation the water supply pipe e may also be opened, if desired.

The cover c^2 of the hopper or receptacle is provided with an aperture or doorway i having a bottom door j and a top door k , said doors being also sectoral in form and mounted on a rod i^2 passing centrally through the cover c^2 of the hopper or receptacle c , and on the lower end of the rod i^2 is a spiral spring i^3 which is held thereon by a nut i^4 , and the spring i^3 the tension of which may be regulated by the nut i^4 serves to force both the top and bottom doors j and k in close contact with the cover c^2 of the hopper or receptacle c . The doors j and k are provided at their outer edges with inclined cam ribs j^2 and k^2 , and the cover c^2 of the hopper or receptacle is provided with an overlapping lug k^3 beneath which the cam rib k^2 operates, and the corresponding side of the hopper or receptacle c is provided with an inwardly directed lug j^3 in connection with which the cam rib j^2 on the door j operates, and by means of this construction the door j is forced when closed in close contact with the bottom of the cover c^2 of the hopper, and the door k in close contact with the upper surface of the cover of the hopper or receptacle, and the passage of air through the door into or from the hopper or receptacle is prevented.

Mounted on the upper end of the rod i^2 is an arm m by which said rod may be turned, and it will be understood that the doors j and k are both rigidly connected with said rod and are both turned at the same time and in the same direction by the arm m .

A suction or filling pipe n is connected with the top portion of the hopper or receptacle c

and extends to the bottom portion of the working chamber b , and said pipe may consist of a flexible hose connected with said hopper or receptacle by an ordinary coupling n^2 having a valve n^3 and with which is connected a tube n^4 which passes into the hopper or receptacle and is provided with a flap valve n^5 which opens inwardly.

The hopper or receptacle is provided with a gage o and the working chamber b with a gage o^2 to determine the pressure of air in said chamber, and by means of the gage o the pressure in the hopper or receptacle c may be determined as well as the difference between the pressure in said hopper or receptacle and that in the working chamber b , and the gage o will also give notice when the hopper or receptacle c is empty at which time the air therein will rush out through the stand pipe d .

It will be understood that the exhaust pipe g communicates directly with the outer air, while the high pressure air pipes h and f communicate with the power house from which pressure is supplied and regulated, and the water supply pipe e communicates with any suitable water supply and the pressure in this pipe must be regulated so as to overcome the pressure of air in the working chamber b and this may be done in the usual or any desired manner.

The hopper or receptacle c is, in the form of construction shown, supported in the outer wall or casing a of the caisson by being bolted or otherwise secured to one of the angle irons a^2 in such manner that the bottom of said hopper or receptacle is slightly above the bottom of the casing a , but said hopper or receptacle may be supported in the working chamber b in any desired manner.

It will be understood that the pressure of air in the working chamber b supplied through the pipe h is so regulated at all times that water will be prevented from coming into said chamber beneath the bottom of the caisson, and in the operation of the apparatus the receptacle c may be filled with material from the bottom of the working chamber by air pressure applied thereto, said material being in a suitable condition and being forced through the pipe n into the receptacle c , after which the pipe n is closed automatically by valve n^5 when high pressure air is turned on through the pipe f which forces the material in the receptacle c out through the stand pipe d . At the beginning of operations, however, the doors j and k may be opened and the material in the bottom of the working chamber b may be shoveled into the receptacle c , after which the doors j and k are closed and high pressure air is admitted to the receptacle through the pipe f . At the beginning of the admission of air into the receptacle c , the branch pipe f^2 may be closed and the air which passes in through the

branch pipe f^3 is intended to stir up and loosen up the contents of said receptacle, and after this is done the branch pipe f^3 may be closed or partially closed and air under pressure is admitted through the branch pipe f^2 sufficient to force the material in the receptacle c out through the pipe d .

If the receptacle c is filled through the pipe n the exhaust pipe g must first be opened so as to permit the air in the receptacle c to pass out, and this pipe is kept open during the filling of said receptacle, after that the admission of high pressure air is not carried to the point where the material in the hopper is entirely freed from the stand pipe as this would entail a waste of air through said stand pipe, and if the doors j and k are opened and the material in the working chamber b shoveled into said receptacle, it will be understood that during this operation the pressure in said receptacle is the same as that in the working chamber b , and after said receptacle has been filled, or partially so, the doors j and k are closed and the material is forced out of said receptacle through the stand pipe d by means of air pressure supplied through the pipe f . It will also be understood that in the beginning of operations or before the caisson is sunk to any considerable depth, the pipe n is closed and the material to be excavated is shoveled into the receptacle c and forced out by means of air pressure through the pipe d as hereinbefore described. The pipe d is also, in practice, provided at any suitable point preferably within the working chamber with a valve d^5 to close said pipe against communication with the outer air whenever desired to make any changes in the adjustment of the various parts of the apparatus or for any other purpose.

Instead of the branch f^3 of the high pressure air pipe n terminating in the distributing pipe f^4 in the bottom of the receptacle c the said branch pipe f^3 may be provided with a supplemental pipe or extension f^6 which extends into the bottom of the stand pipe d for the purpose of creating a suction in said stand pipe and facilitating the removal of material from the receptacle c therethrough and the drawing of material from the working chamber b through the pipe n , or the branch pipe f^6 and air distributing pipe f^4 may both be employed if desired.

In the accompanying drawing and foregoing description, I have shown and described only those features which constitute my invention, but, in practice, all the well known necessary accessories used in or in connection with the apparatus of this class are employed.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A caisson provided with a working

chamber in the bottom thereof, a receptacle placed in said chamber and provided with a cover and a bottom, a stand pipe extending down through the caisson and into the receptacle at or near the bottom thereof, means for filling said receptacle with excavating material, and means for supplying air and water under pressure to said receptacle and for supplying air to said working chamber.

2. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, means for supplying material to said receptacle from the bottom of the working chamber, a stand pipe extending vertically through the caisson and into said receptacle and down approximately to the bottom thereof, a high pressure air pipe extending vertically through the caisson and into said receptacle, a water pipe extending vertically through the caisson and into the receptacle, and means for supplying air to the working chamber.

3. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, means for supplying material to said receptacle from the bottom of the working chamber, a stand pipe extending vertically through the caisson and into said receptacle and down approximately to the bottom thereof, a high pressure air pipe extending vertically through the caisson and into said receptacle, a water pipe extending vertically through the caisson and into the receptacle, and means for supplying air to the working chamber, the top of said receptacle being also provided with a cover having an aperture, and means for opening and closing the same.

4. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, means for supplying material to said receptacle from the bottom of the working chamber, a stand pipe extending vertically through the caisson and into said receptacle and down approximately to the bottom thereof, a high pressure air pipe extending vertically through the caisson and into said receptacle, a water pipe extending vertically through the caisson and into the receptacle, and means for supplying air to the working chamber, the top of said receptacle being also provided with a cover having an aperture, and means for opening and closing the same, consisting of doors mounted above and below said cover, and means for operating said doors.

5. A caisson provided with a working chamber in the bottom thereof, a receptacle within said chamber and closed at the top and open at the bottom, said receptacle being also provided with an inner bottom having a central hand opening, and means for closing the same, a stand pipe extending vertically through the caisson and down through the cover of the receptacle into the bottom por-

tion thereof, a filling pipe connected with the top portion of the receptacle and extending to the bottom portion of the working chamber, means for supplying water under pressure to said receptacle, means for supplying air under pressure to said receptacle, and means for supplying air to the working chamber.

6. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber and closed at the top and open at the bottom, said receptacle being also provided with an inner bottom having a central hand opening, and means for closing the same, a stand pipe extending vertically through the caisson and down through the cover of the receptacle into the bottom portion thereof, a filling pipe connected with the top portion of the receptacle and extending to the bottom portion of the working chamber, means for supplying water under pressure to said receptacle, means for supplying air under pressure to said receptacle, and means for supplying air to the working chamber, said receptacle and said working chamber being also provided with air gages.

7. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, a filling pipe connected with said receptacle and extending to the bottom portion of the working chamber, a stand pipe extending through the caisson and into the bottom portion of the receptacle, and means for forcing material out of said receptacle through said stand pipe.

8. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, a filling pipe connected with said receptacle and extending to the bottom portion of the working chamber, a stand pipe extending through the caisson and into the bottom portion of the receptacle, and means for forcing material out of said receptacle through said stand pipe, the top of said receptacle being also provided with an aperture, and means for opening and closing the same.

9. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, a stand pipe communicating with the bottom portion of said receptacle and a high pressure air pipe communicating with said receptacle by means of separate branches one of which communicates with the bottom portion of said receptacle and the other with the top portion thereof, and means whereby the said receptacle may be filled or partially filled with material from the bottom of the working chamber.

10. A caisson provided with a working chamber in the bottom thereof, a receptacle supported in said chamber, a stand pipe communicating with the bottom portion of said receptacle and a high pressure air pipe communicating with said receptacle by means of separate branches one of which communicates with the bottom portion of said receptacle and the other with the top portion thereof, and means whereby the said receptacle may be filled or partially filled with material from the bottom of the working chamber, comprising a pipe connected with said receptacle and extending into the bottom portion of the working chamber.

11. A caisson provided with a working chamber in the bottom thereof, a receptacle placed in said chamber, a stand pipe extending down through the caisson and into the receptacle and approximately to the bottom thereof, means for filling said receptacle with excavated material and means for supplying air and water under pressure to said receptacle and for supplying air to said working chamber.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 13th day of April 1907.

ALEXANDER Z. McLEOD.

Witnesses:

C. E. MULREANY,
A. WORDEN GIBBS.