H. C. GLICK.

CAISSON DREDGE.

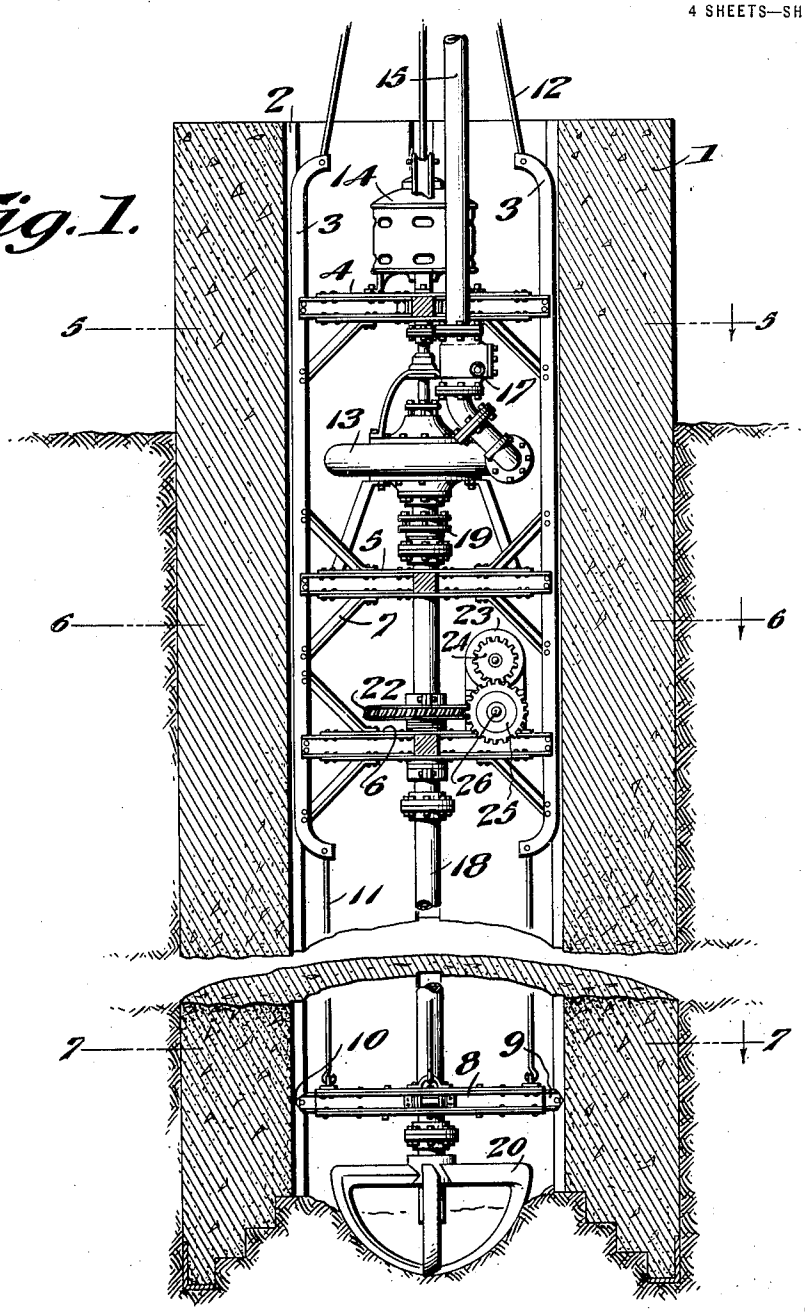
APPLICATION FILED SEPT. 23, 1920.

1,380,203.

Patented May 31, 1921.

4 SHEETS—SHEET 1.

Fig. 1.




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4 SHEETS—SHEET 2.

Fig. 2.

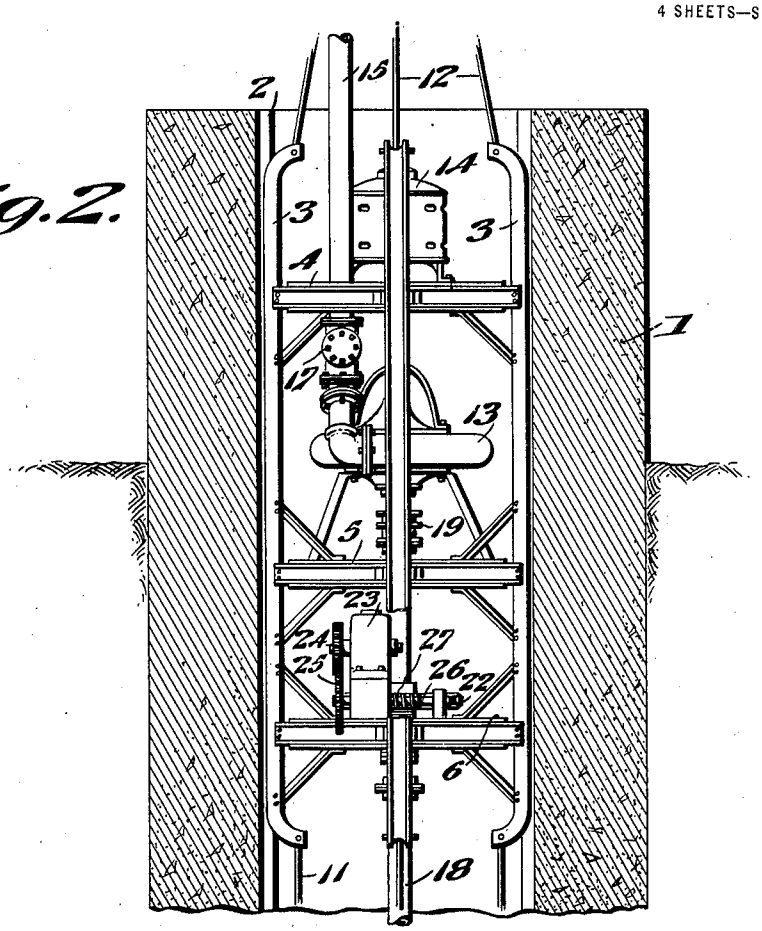
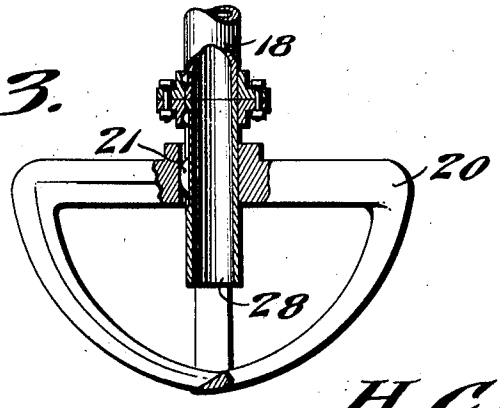



Fig. 3.




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4 SHEETS—SHEET 3.

Fig. 4.

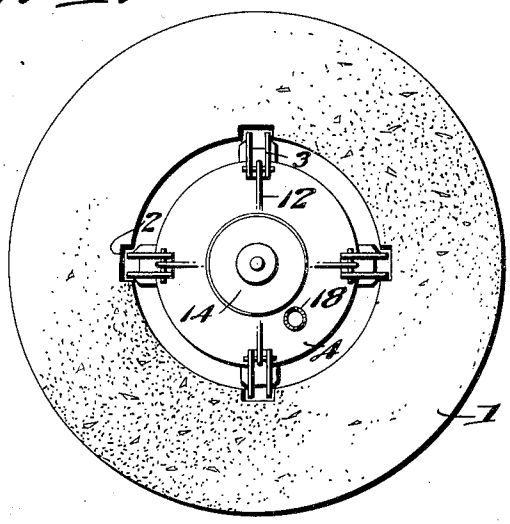
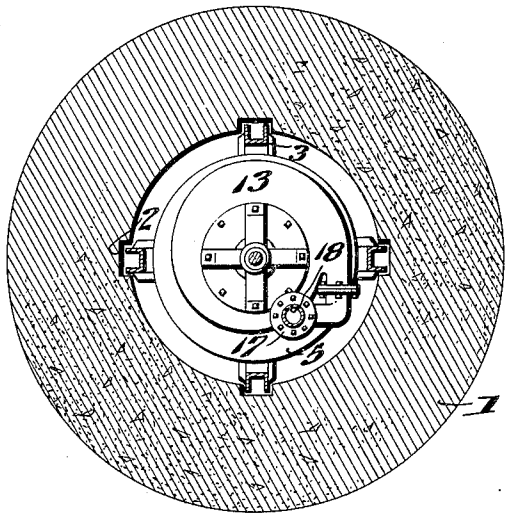



Fig. 5.




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4 SHEETS—SHEET 4.

Fig. 6.

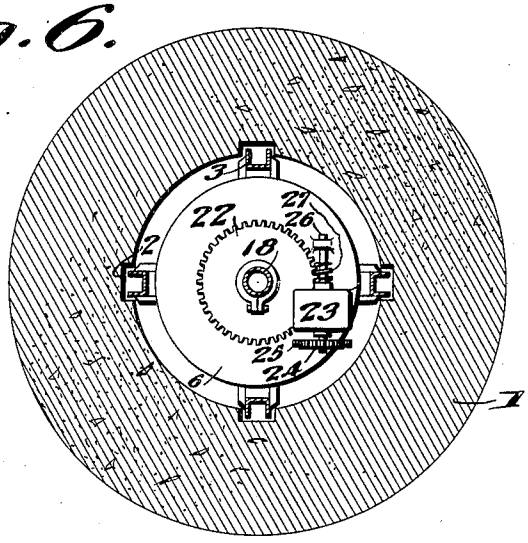
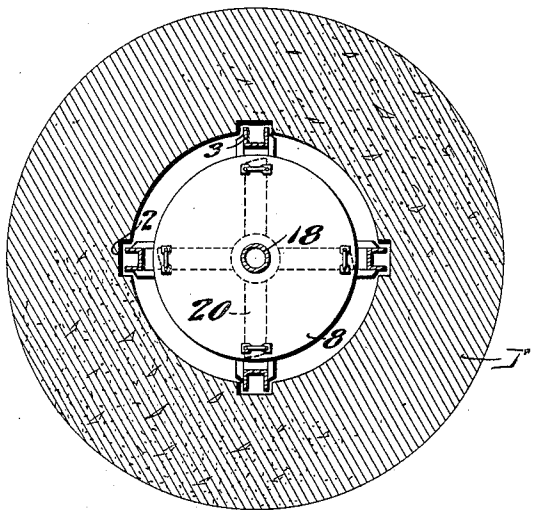



Fig. 7.




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# UNITED STATES PATENT OFFICE.

HARVEY C. GLICK, OF PARIS, IDAHO.

## CAISSON-DREDGE.

1,380,203. Specification of Letters Patent. Patented May 31, 1921.

Application filed September 23, 1920. Serial No. 412,272.

*To all whom it may concern:*

Be it known that I, HARVEY C. GLICK, citizen of the United States, residing at Paris, in the county of Bear Lake and State of Idaho, have invented certain new and useful Improvements in Caisson-Dredges, of which the following is a specification.

This invention relates to caisson dredges, and particularly to a dredge or earth excavating structure adapted to be used in connection with concrete or other caissons being sunk vertically into the earth.

An object of my invention is to provide a dredge structure for use in a caisson adapted to loosen the earth at the lower end of the caisson and to remove this earth in the form of mud or slimes to some remote place as desired.

A further object resides in constructing the machine to secure a maximum of working and pumping force on a minimum consumption of power, and in providing for a mud suction which will keep the earth cutting and agitating element clear at all times during operation of the machine.

A still further object lies in so constructing and arranging the parts that a frame upon which the structure is mounted can be swung by cables from a derrick or locomotive crane to be lowered and hoisted within the caisson, and can be entirely withdrawn to permit placing of other sections of caissons.

With these and other objects in view, which will be apparent from the drawings, specification and claims, this invention includes certain novel features of construction and combinations of parts which will now be set forth.

In the drawings:

Figure 1 is a vertical sectional view through a caisson and portions of the dredge structure to show the main construction and the manner of using the device of my invention.

Fig. 2 is a vertical sectional view taken at right angles to Fig. 1, of the upper part of the structure.

Fig. 3 is an enlarged sectional view taken vertically through the cutter head.

Fig. 4 is a plan view looking down on the open top of the caisson.

Fig. 5 is a transverse sectional view through the structure on line 5—5 of Fig. 1.

Fig. 6 is a horizontal sectional view on line 6—6.

Fig. 7 is a similar sectional view on the line 7—7 of Fig. 1.

The caisson may be of any standard or special size, the present illustration being of a caisson of some eight feet in diameter, with a two foot shell. The caisson 1 has the longitudinal grooves or guide ways 2 formed longitudinally in the inner wall thereof.

The main operating structure is carried by a car adapted to be lowered and raised within the caisson this car being made up of vertical bars 3 adapted to be received and to slide in the guide ways 2 of the caisson, machinery flats 4, 5 and 6 being associated with these vertical bars, and the entire structure being reinforced and stiffened by means of braces 7 connected diagonally between the machinery flat structure and the vertical bars.

A cutter head carrying frame 8 has extending arms 9 received in the guide ways 2 of the caisson, and friction rolls 10 are provided to insure free movement of this carrying frame. That the vertical bars 3 may slide readily within the guide ways 2, they are curved inwardly at their top and bottom ends, rods or cables 11 being connected with the cutter head carrying frame 8 and the curved lower ends of bars 3 to support the frame 8 pendantly beneath the main frame. Sling cables 12 are connected with the curved upper ends of bars 3 and provide a medium for suspension of the two connected frames by a stiff-legged derrick or from the boom of a locomotive crane. In this way the structure is supported, and may be raised and lowered, within the caisson, the car structure and the cutter head carrying frame being held against rotation therein.

A centrifugal pump 13 is mounted on machinery flat 5, and a pump motor 14 on machinery flat 4 is connected to operate this pump. A mud discharge pipe 15 is connected with valve box 17 through which the pump 13 discharges, and this discharge pipe will be extended to the top of the caisson and will be led off to any desired point where the material taken from the bore is to be discharged.

A mud suction pipe 18 extends down through machinery flats 5 and 6 and through the carrying frame 8, a packing gland being provided at 19 to couple this suction pipe revolubly to the suction of the pump 13. This suction pipe 18 is of extra heavy gage, so that it will stand considerable torque,

and on its lower end has a cutter head or agitator 20, the construction of which is best shown in Fig. 3, fixed by key 21 or other suitable locking means to be held against turning thereon.

This suction pipe 18 is mounted in bearings within machinery flats 5 and 6 and carrying frame 8, for revoluble movement on a vertical axis, and has a worm gear 22 fixed thereon above the machinery flat 6. A cutter rotating motor 23 is mounted on this machinery flat 6 and through gears 24 and 25 rotates shaft 26. This shaft 26 has a worm 27 thereon in mesh with worm gear 22, and through the worm and worm gear a material reduction in speed is accomplished at the suction pipe 18 to thus turn the cutter head at a low speed and to secure maximum power.

By experiment it has been found that a vertical centrifugal pump of four inch size can be mounted within the confines of the car upon the machinery flat 5, and that such a pump will operate efficiently. In fitting the cutter head 20 the suction pipe 18 is extended to have its intake end 28 well down within the arms of the cutter head or agitator so that the suction to the pump will be from a point well down in the bore formed by the cutter head.

In the use of my invention the car and the carrying frame are swung by cables 12 from the stiff-legged derrick or locomotive crane and the device is lowered to bring the cutter near the bottom, the hoist runner being then signaled to stop lowering the dredge and to hold the position. Under some conditions of operation the cutter head, and consequently the intake end 28 of suction pipe 18 will be submerged in ground water, or if there is not sufficient water in any particular operation this will be supplied through the top of the caisson to come above the level of the suction intake. Pump 13 is primed in any convenient manner as by the use of a water injector or steam siphon, and the motor is then started. When the pump is operating properly the cutter motor 23 is started. This motor turns the suction pipe 18 and consequently cutter head 20 at a very low speed and with maximum power. The dredge operator then signals the hoist runner to lower the dredge to the proper working depth, and as the cutter loosens the earth at the lower end of the caisson this earth is mixed with the water in the caisson and is taken up by pump 13 through suction pipe 18, the caisson gradually sinking through its own weight as the earth is excavated at its lower end. The proper working depth for the dredge, and the proper operation of the same can be determined by vacuum and pressure gages, or by other suitable means. These control means, and the means for priming the pump may be of any desired type, and as such structure has heretofore been used it is not here illustrated.

When the caisson is sunk far enough for more concrete forms to be placed on top, or to its final footing, the dredge is stopped, hoisted up, and may then be swung into another caisson where the operation is repeated.

In some uses the water in the caisson may remain at a high level and under these circumstances an additional length, or lengths, of suction pipe 18 can be coupled in, the rods or cables 11 being correspondingly lengthened. The machinery flat 6 will then always remain above the water line. Further, it may be found desirable to adjustably mount arms 9 carrying friction rolls 10 so that the cutter may be moved nearer to one side of the caisson, thus providing for righting the caisson should it become slightly out of plumb. The above suggested changes will be apparent to those skilled in the art and are not here illustrated or described in detail.

While, in the foregoing, I have described specific embodiments, and have mentioned only certain possible modifications, it will be appreciated that in practice I do not limit myself to such specific details as herein stated, but may resort to any practical modifications falling within the scope of the invention as defined in the appended claims.

I claim:

1. A caisson dredge including with a cutter head to loosen earth at the bottom of the caisson and agitate the earth with water, a suction pump having a discharge emptying above the top of the caisson, and a suction pipe from said pump forming the shaft by which the cutter head is revolved and having its suction end opening well down between the arms of the cutter head.

2. A caisson dredge including with a car carried by suspension cables to be lowered into and raised from a caisson and adapted to carry the operating machinery of the dredge, a cutter head frame suspended beneath the car, a suction pump mounted on the car and having a discharge pipe leading therefrom to discharge above the top of the caisson, a motor carried by the car for operation of said pump, a suction pipe mounted vertically beneath the pump in bearings provided in the car structure and the cutter head frame and having revoluble connection with the pump, a cutter head fixed on said revoluble suction pipe to dispose the suction opening well down within the cutter structure, and means to revolve the suction pipe.

3. A caisson dredge including with a caisson having guide ways formed vertically in the inner wall thereof, a car to be lowered and raised within the caisson having vertical bars received to travel in said guide

ways to direct the travel of the car and hold the same against rotation within the caisson, and cutter head and suction pump means carried by said car to loosen earth at the bottom to be discharged at the top thereof.

4. A caisson dredge including with a car adapted to be lowered and raised within a caisson and having a plurality of machinery flats one above the other, a cutter head frame suspended beneath said car, a suction pump mounted on one of the machinery flats and having a discharge pipe connected therewith to discharge at the upper end of the caisson, a pump operating motor mounted on a machinery flat above said pump, a suction pipe mounted vertically in bearings provided on said car and the cutter head frame and given revoluble connection with the pump, a cutter head fixed on the lower end of the suction pipe to dispose the intake end of said pipe within a pocket formed by said cutter head, and means carried on one of the machinery flats to rotate said suction pipe and consequently the cutter head.

5. A caisson dredge including with a caisson having guide ways formed vertically in the inner wall thereof a car made up of machinery flats connected by vertical bars spaced to be received and to travel in the guide ways of the caisson, a cutter head frame suspended beneath the car, said car and cutter head frame being adapted to be lowered and raised within the caisson and being held against rotation by portions received in the guide ways, a suction pump mounted on one of the machinery flats of the car, a discharge pipe from said pump to discharge above the top of the caisson, a motor carried on one of the machinery flats above said pump connected to operate the same, a suction pipe mounted vertically in bearings on the car and cutter head frame and revolubly connected with the suction of said pump to be centered within the caisson, a worm gear fixed on said suction pipe, an operating motor mounted on one of the machinery flats to turn a worm meshing with the worm gear to revolve the suction pipe, and a cutter head fixed on the lower end of said suction pipe to loosen earth at the bottom of the caisson and having the intake end of said pipe extended to be well down toward the extreme lower cutting point.

In testimony whereof I affix my signature.

HARVEY C. GLICK.