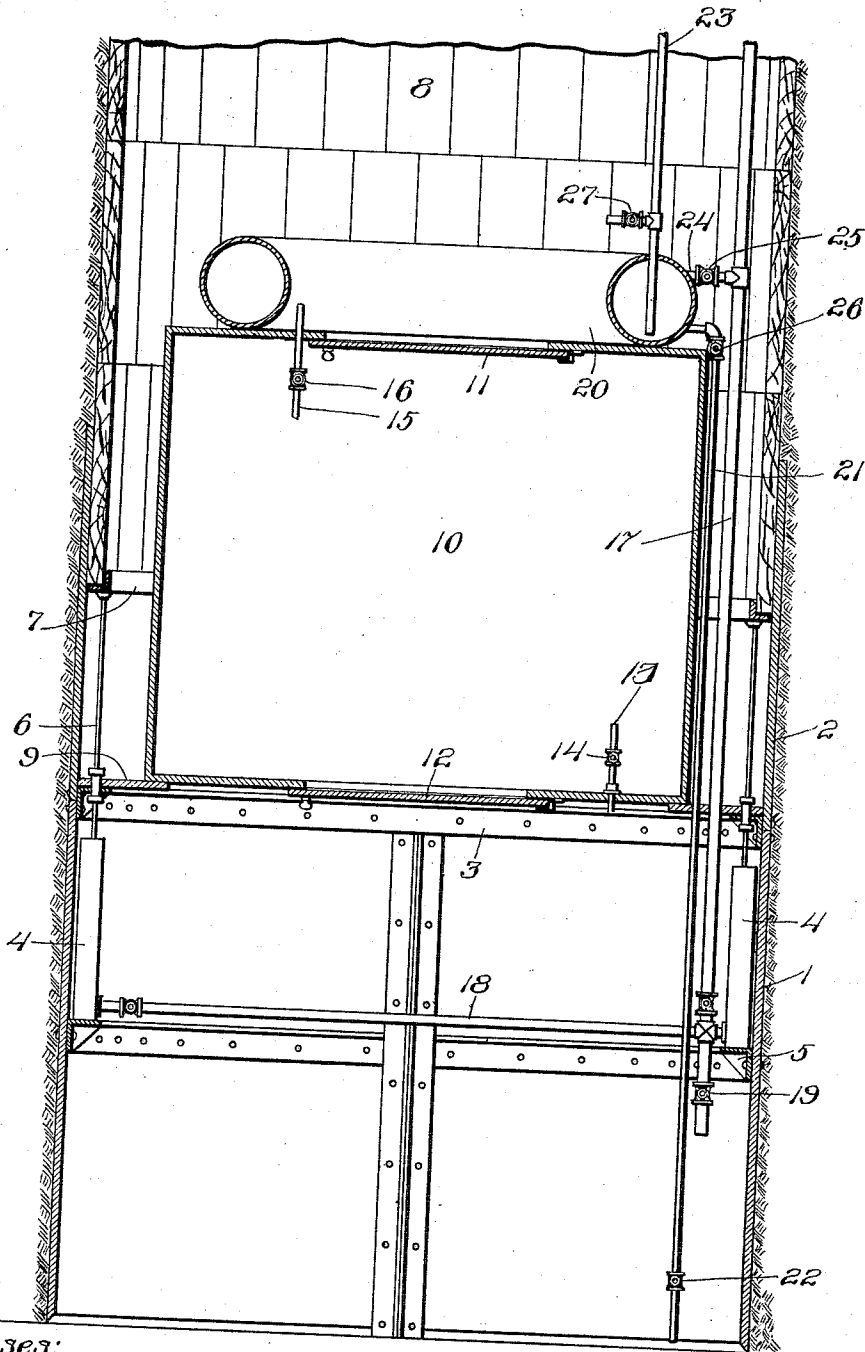


G. R. MOORE.
 APPARATUS FOR SINKING WELLS.
 APPLICATION FILED JULY 31, 1911.

1,018,725.

Patented Feb. 27, 1912.



Witnesses:

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UNITED STATES PATENT OFFICE.

GEORGE R. MOORE, OF CHICAGO, ILLINOIS.

APPARATUS FOR SINKING WELLS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE R. MOORE, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have
5 invented a certain new and useful Improvement in Apparatus for Sinking Wells, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it
10 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object to provide
15 a simple and novel apparatus for sinking wells in locations where considerable water is encountered.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in
20 the appended claims; but, for a full understanding of my invention and of its object and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing
25 which is a central vertical section through a well in the process of being formed by means of my apparatus.

In one of its aspects my invention may be regarded as a development of the invention
30 described and claimed in my prior application Serial No. 584,845, the purpose of the present invention being to adapt the apparatus of the aforesaid application for use in places where much water will be encountered in sinking a well.
35

In the present arrangement I make use of a divided shell which is forced down into the ground and within and above which
40 lagging is set up as the excavating progresses. In according with my invention I provide an air lock which travels with the shield and permits a pressure to be maintained in the working chamber at the lower
45 end of the shield, and there is preferably also a water lock which permits the water to be withdrawn if the pressure which it is feasible to employ in the working chamber is not sufficient to keep back the water.

Referring to the drawing 1 and 2 represent two halves of a cylindrical steel casing
50 or shell which is divided into two parts along a plane at right angles to the axis. Each half of the shell or casing may be made in several parts which are detachably
55 connected together, as in my aforesaid application, so as to permit the entire casing

to be recovered upon the completion of the well when conditions permit. The two halves of the shell are detachably connected together by means of an annular angle iron
60 3. Within the member 1, which is the shoe or cutting member, there are several jacks 4 resting upon suitable brackets or supports 5 secured to the interior of the shoe. The
65 movable plungers, 6, of the jacks extend upwardly and support an annular follower 7. The follower rests against the bottom edge of the lowermost layer of lagging 8 and the lagging consequently forms an abutment for
70 taking the thrust of the jacks as the shell or casing is forced down. In operation the jacks are worked until there is sufficient
75 room between the bottom layer of lagging and the follower, when the plungers are dropped, to permit another layer of lagging to be inserted between the last layer and the follower.

All the parts heretofore described are substantially the same as illustrated in my
80 prior application.

In accordance with my invention I place in the shell or casing a transverse partition
85 9, this being conveniently detachably secured upon the angle iron 3 which joins the two halves of the casing together. Above the partition I mount a closed chamber or receptacle 10 having a door 11 in the top and a similar door 12 in the bottom. A pipe
90 13 having therein a valve 14 is adapted to place the chamber 10 in communication with the working chamber in the lower half of the shell or casing. A second pipe 15 having therein a valve 16 is adapted to place the interior of the chamber 10 in communication with the surrounding atmosphere.
95 Extending down into the well and through the partition 9 is an air supply pipe 17 which is adapted to supply compressed air to the working chamber.

It will be seen that if both of the doors
100 in the chamber 10, which constitutes the air lock, are closed and the valve 14 is opened, the pressure in the air lock and in the working chamber will be equalized so that the door 12 may be opened so as to permit the
105 passage of a workman or of excavated material in either direction between the air lock and the working chamber. Then, upon closing the door 12 and the valve 14, and opening the valve 16, the compressed air in
110 the air lock escapes to atmosphere so that the upper door may swing open to permit

the passage of a workman or of excavated material.

I prefer to use pneumatic jacks for forcing the shield or casing down and therefore, in order to reduce the number of pipe lines, I prefer to use a high pressure in the supply pipe 17 so that the jacks may be operated from compressed air flowing out of the supply pipe through a suitable valved branch pipe 18. In order to prevent the pressure in the working chamber from becoming excessive I place a suitable reducing valve 19 at the outlet end of the supply pipe 17 so that the pressure in the working chamber may be suitably regulated.

It sometimes happens that there is so much water present at the bottom of a well that the ordinary air pressure which the workman can stand is insufficient to keep it back and therefore I prefer to provide a suitable water lock which will permit water to be withdrawn from the bottom of the well. In the arrangement shown I have mounted a water reservoir 20, in the form of a large hollow ring, on top of the air lock and have provided a pipe 21 leading from this reservoir to a point near the bottom of the shield or casing. The ordinary working pressure in the working chamber is sufficient to force water up through the pipe 21 and into the reservoir, backward flow being prevented by a check valve 22. A discharge pipe 23 leads from a point near the bottom of the reservoir to the top of the well and a branch pipe 24 leads from the supply pipe 17 into the top of the reservoir. The pipe 24 is provided with a valve 25 so that communication between the pipe 17 and the reservoir may be opened and closed as desired. It will be seen that when there is water in the reservoir and the valve 25 is opened, air will flow from the supply pipe into the reservoir and will press down upon the top of the water and cause the water to flow up through the discharge pipe 23. During this time the check valve 22 prevents the water from flowing back through the intake pipe, or further assurance against a back flow may be afforded by means of a hand valve 26 in the pipe 21 at a point adjacent to the reservoir. If desired, a suitable tell tale valve 27 may be placed in the discharge pipe 23 directly above the reservoir so as to indicate when the reservoir is full of water. It will thus be seen that water may be withdrawn from the working chamber in a simple and convenient manner and in any desired quantities depending upon the size of the pipes and the pressure employed; this being accomplished without increasing the pressure in the working chamber beyond the point which is comfortable to the workman.

When the excavation has been completed the air lock and the water lock may be removed so as to be saved for future excavat-

ing purposes and, where the conditions permit, the shield or casing itself may be knocked down and removed.

It will thus be seen that I have provided a simple and efficient apparatus for excavating vertical wells under the most adverse conditions as to water encountered and one in which it is possible to save all of the parts so that they may be used over again.

While I have illustrated and described only a single preferred form of my invention, I do not desire to be limited to the particular structural details thus illustrated and described; but intend to cover all forms and arrangements which fall within the terms employed in the definitions of my invention constituting the appended claims.

I claim:

1. A well sinking apparatus comprising a casing open at the top and bottom, the bottom edge of the casing being in the form of a cutting member, lagging adapted to be set up within the casing to form a lining for a well which is being sunk, a power device carried by the casing and constructed and arranged to engage with the lagging and produce a relative separating movement in the vertical direction between the lagging and the casing, a partition extending across said casing between the ends thereof, and an air lock carried by said partition.

2. A well sinking apparatus comprising a casing open at the top and bottom, the bottom edge of the casing being in the form of a cutting member, lagging adapted to be set up within the casing to form a lining for a well which is being sunk, a power device carried by the casing and constructed and arranged to engage with the lagging and produce a relative separating movement in the vertical direction between the lagging and the casing, and an air lock carried by and movable with said casing.

3. A well sinking apparatus comprising a casing open at the top and bottom; the bottom edge of the casing being in the form of a cutting member, lagging adapted to be set up within the casing to form a lining for a well which is being sunk, a pneumatic power device carried by the casing and constructed and arranged to engage with the lagging and produce a relative separating movement in the vertical direction between the lagging and the casing, a partition extending transversely across the casing between the ends thereof, an air lock carried by said partition, and means for supplying air under pressure into the casing beneath the partition and to said power device.

4. A well sinking apparatus comprising a casing open at the top and bottom; the bottom edge of the casing being in the form of a cutting member, lagging adapted to be set up within the casing to form a lining for a well which is being sunk, a pneumatic

power device carried by the casing and constructed and arranged to engage with the lagging and produce a relative separating movement in the vertical direction between the lagging and the casing, a partition extending transversely across the casing between the ends thereof, an air lock carried by said partition, means for supplying air under pressure into the casing beneath the partition and to said power device, a water reservoir mounted above said air lock, an intake pipe extending from said reservoir to the bottom of the casing, a discharge pipe leading from the bottom of the reservoir, and means for introducing compressed air into said reservoir.

5. A well sinking apparatus comprising a casing open at the top and bottom, the bottom edge of the casing being in the form of a cutting member, lagging adapted to be set up within the casing to form a lining for a well which is being sunk, a partition extending transversely across the casing between the ends thereof, a pneumatic jack carried by the casing beneath the partition, a plunger extending from the jack through the partition and adapted to engage with the lagging and produce a relative separating movement in the vertical direction between a lagging and the casing, an air lock carried by said partition, and means for supplying air under pressure into the casing below the partition and to the jack.

6. A well sinking apparatus comprising a casing open at the top and at the bottom, the bottom of the casing being in the form of a cutting member, lagging adapted to be set up in the casing to form a lining for a well which is being sunk, a power device carried by the casing and constructed and arranged to engage with the lagging and produce a relative separating movement between the lagging and the casing in the vertical direction, a partition extending across the casing between the ends thereof, and an air lock and a water lock carried by said partition.

7. A well sinking apparatus comprising a casing open at the top and at the bottom, the bottom edge of the casing being in the form of a cutting member, a partition extending across said casing between the ends thereof, an air lock carried by said partition, a water reservoir, an inlet pipe extending from said reservoir to a point below said partition, a discharge pipe extending up from said reservoir, and an air supply system for introducing air under pressure into the top of the reservoir and into the casing below the partition.

In testimony whereof, I sign this specification in the presence of two witnesses.

GEO. R. MOORE.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."