No. 887,952. PATENTED MAY 19, 1908.

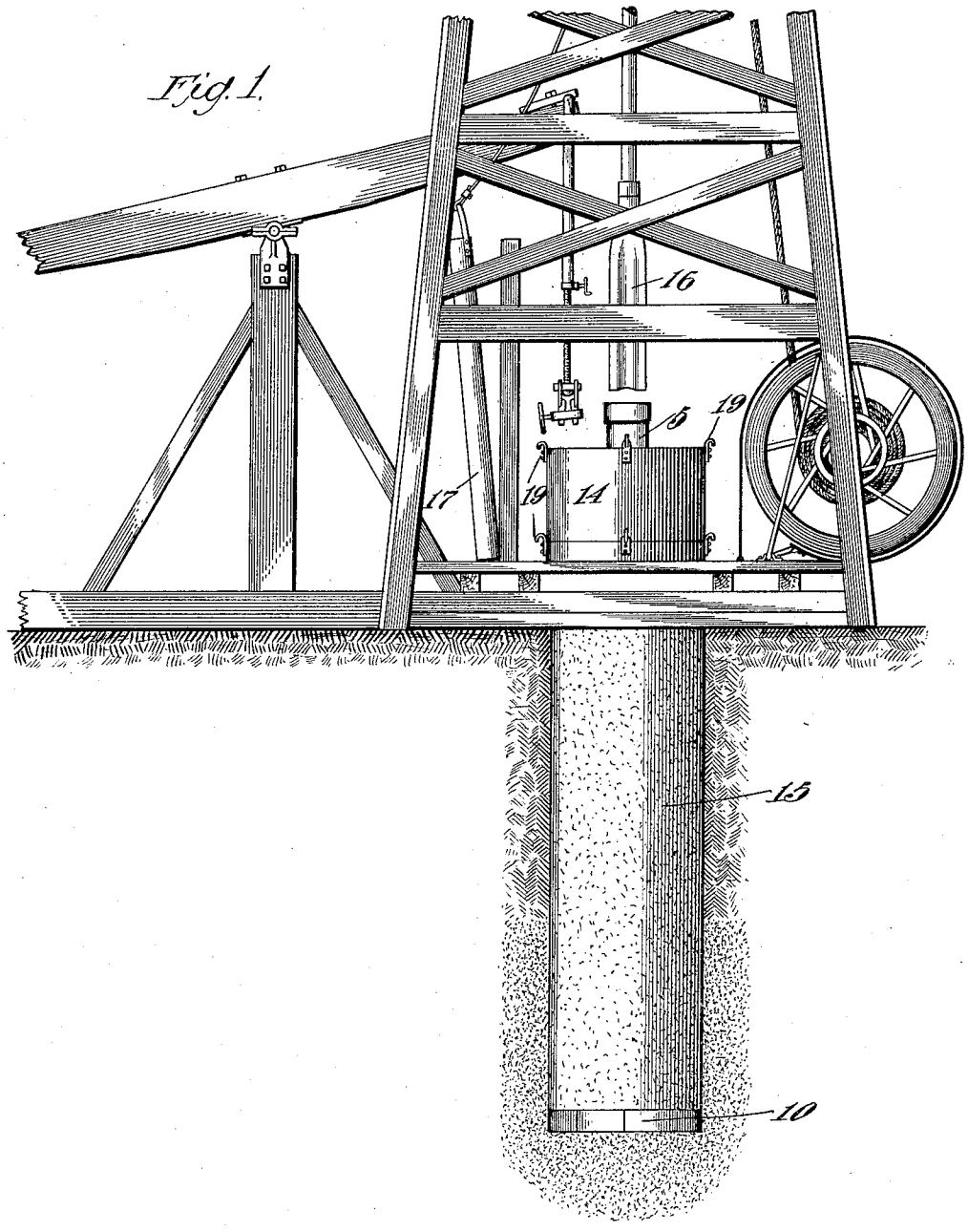
J. H. MILLIGAN.

MEANS FOR DRILLING WELLS.

APPLICATION FILED MAY 13, 1907.

3 SHEETS—SHEET 1.

Fig. 1.




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3 SHEETS—SHEET 2.

Fig. 4.

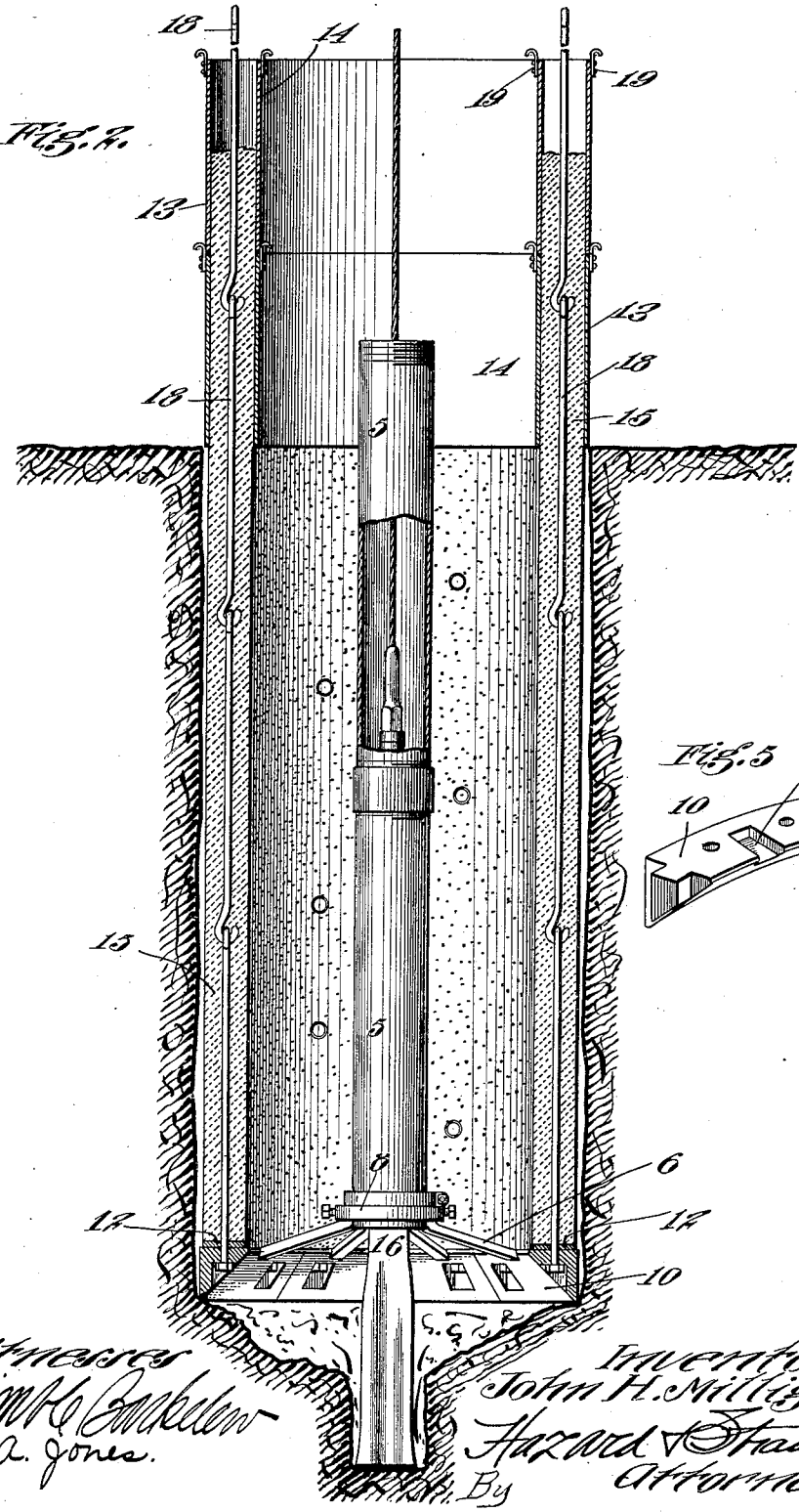



Fig. 5.




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3 SHEETS—SHEET 3.

Fig. 3.

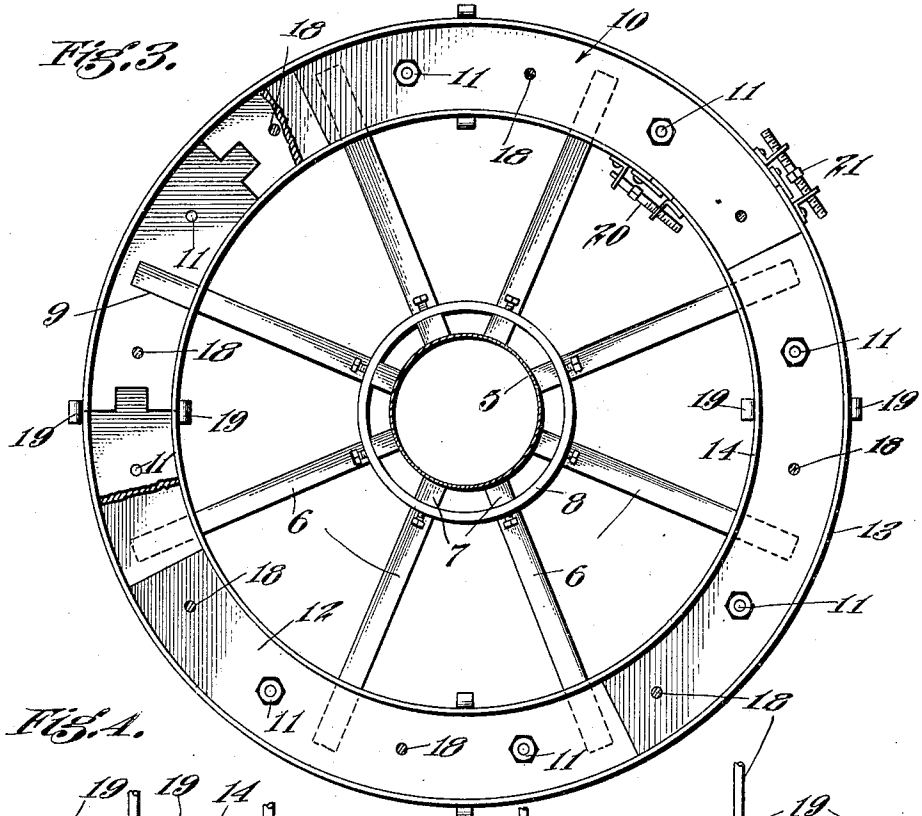
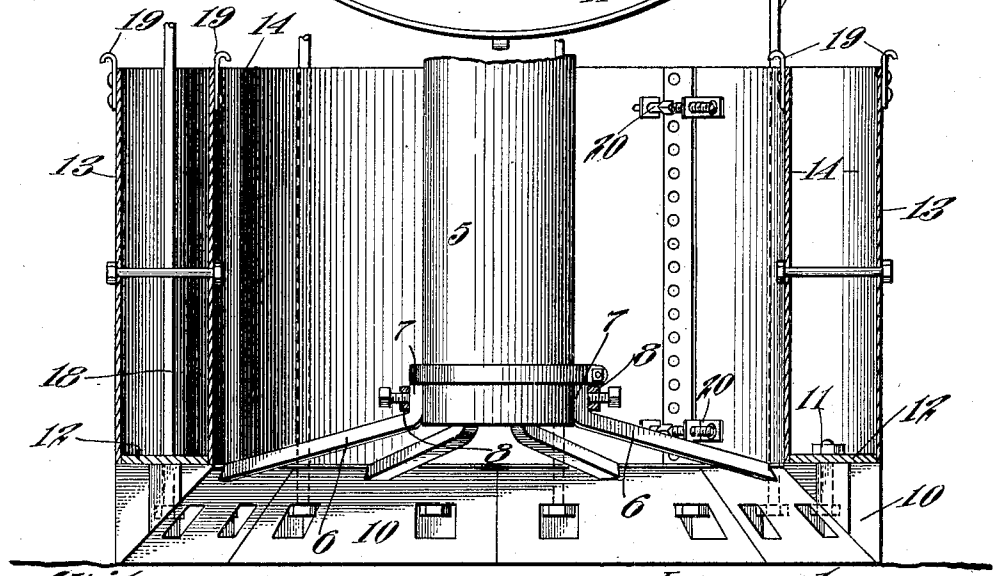



Fig. 4.




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# UNITED STATES PATENT OFFICE.

JOHN H. MILLIGAN, OF SAN BERNARDINO, CALIFORNIA.

## MEANS FOR DRILLING WELLS.

No. 887,952. Specification of Letters Patent. Patented May 19, 1908.

Application filed May 13, 1907. Serial No, 373,496.

*To all whom it may concern:*

Be it known that I, JOHN H. MILLIGAN, a citizen of the United States, residing at San Bernardino, in the county of San Bernardino and State of California, have invented new and useful Improvements in Means for Drilling Wells, of which the following is a specification.

My invention relates more particularly to means to bore or drill large wells in sandy or loose soil or in quick sand; and the object thereof is to prevent the wall from caving in as the well hole is being dug. I accomplish this object by means of the device described herein and shown in the accompanying drawings, in which:—

Figure 1— is a fragmentary elevation of a derrick used for drilling purposes in place above where the well hole is to be drilled and shows a well partially drilled therein with concrete curbing in place forming the walls thereof. Fig. 2— is a central vertical section of a well hole with concrete casing in place therein, showing in elevation the lower part of the central cylindrical working casing with a drilling tool in place therein. Fig. 3— is a plan of the concrete curb supporting shoe. Fig. 4— is a central vertical section of the curb forming jackets with a fragment of the central working casing in place therein. Fig. 5 is a detailed perspective view of one of the shoe sections.

In digging wells in loose or sandy soil where the sides of the well are liable to cave in it becomes necessary to provide a curbing or casing for the well hole as the hole is drilled or dug into the ground. If the well is of any considerable diameter, and my invention is especially adapted for forming large well holes, the operation is attended with a great deal of difficulty and danger and is usually very expensive. To overcome these objections I have provided means whereby the well curbing can be constructed as the well hole is dug into the ground and to that end I provide means whereby concrete, the proper material, can be used therefor. The soil, being of a character liable to cave in, will have a tendency to roll to the bottom and fill up any hole made therein. I take advantage of this peculiarity of soil by providing means to drill a hole of ordinary size in the center and letting the surrounding soil crumble, or work thereinto and to that end I employ the usual casing used in drilling well holes and consists of different sections of screw pipe 5. The lower section of this casing is held in proper alinement in the middle of the well hole by the shoe holding spider legs 6. These legs are provided with upturned portions 7 adapted to contact with the outside walls of the inner casing, and are surrounded by the annular band 8. The lower ends of the legs rest in sockets 9 in the annular metallic shoe 10, a plan of which is shown in Fig. 3. This shoe is placed above the location of the well hole and the central working casing 5 placed in the spider therein. This shoe is made in sections for the purpose of removal as will be hereinafter described. Resting upon the shoe and secured thereto by the bolts 11 is an annular plate 12. This forms the bottom support for the first section of cement used in the well curbing. The outer curb-forming jacket 13 and the inner curb-forming jacket 14 rest upon the concrete supporting shoe 10, the outer jacket dropping into place thereon on the outside of the concrete supporting ring 12 and the inner jacket 14 dropping into place on the shoe on the inside of said annular ring.

The first section of the jackets (two sections being necessary) being in place on the shoe, is filled with concrete 15, then the second set of jackets is placed thereon and when the concrete first formed has set sufficiently rigid to form a section of self-supporting curbing, the bottom jackets are removed and are placed above and on top of the concrete section of curb above and above the top of the other set of jackets and are again filled with concrete and when this section of concrete next below the top has set sufficiently rigid to form a curb, the jackets are again removed therefrom and elevated on top of the last formed section to form a superimposed section of curbing thereabove and so on. In the meantime the drilling tool 16 is put to work and a central hole is caused to be made in the center of the well hole in a manner more particularly illustrated in Fig. 2—the weight of the superimposed concrete curbing resting upon the annular concrete supporting shoe will cause the shoe to move downwardly as the hole is being drilled in the center and bottom of the well hole. I have refrained from entering into a description of the manner in which well holes are drilled, because the operation thereof and the means employed are well known to those versed in the art and constitutes no part of my invention. The walls of the well hole will not cave in as the curbing

will move downwardly as the soil is taken up through the central operating casing 5.

It will be understood that my well drilling apparatus is particularly adapted for drilling wells in soil where water abounds or when water is put into the well hole to facilitate the drilling as the soil is mixed with water and removed from the well hole by means of the usual sand bucket 17, the operation of which is well understood.

To impart additional rigidity to the concrete curbing in its uncured state as the same is crowded down into the well hole, and to keep the different sections in proper vertical alinement I interpose the stiffening rod 18.

The curb-supporting shoe is removed when the well hole is completed section by section by removing first the central working casing and the supporting spider legs 6 resting thereon. Excavation is then made under one of the sections of the shoe, the bolts 11 are unscrewed from the plate or the heads thereof broken off and the section permitted to drop down vertically into the excavation thus made and removed therefrom; the hole caused thereby is filled up and another section is removed in like manner until all the sections of the shoe are removed when the concrete curbing will rest on the bottom of the well.

Projecting upwardly from the inner and outer jackets are jacket-retaining lugs 19 and provide handles to elevate the jackets themselves and to hold the other set of jackets resting above them in proper alinement with the jackets below, assisting thereby in securing a uniformly straight and vertical curbing. The diameter of the inner jacket may be decreased and the diameter of the outer jacket increased for the purpose of removal by means of the screw buckles 20 and 21 respectively.

In the drawings I have shown the ordinary well drilling apparatus arranged to use the ordinary drilling tool therein but for forming wells in quick sand situations, the spider may be so arranged that the working casing will have a sliding movement up and down therein and a wrecking pump adapted to work in water containing sand may be employed to elevate the contents from the bottom of the hole, thereby undermining the concrete supporting shoe and permitting it to descend as the quick sand and water is removed from the bottom of the well hole. In this case the central working casing will rest more or less upon the sand in the bottom.

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

1. In a well drilling apparatus, an annular curb supporting shoe having a centrally located casing supporting spider thereon, a working casing resting on said spider, and concrete forming jackets adapted to form a curb on said shoe.

2. In a well drilling apparatus, an annular shoe, a centrally disposed casing supporting spider on said shoe, a casing resting on said spider, in combination with curb forming jackets of diameters corresponding to the inner and outer diameters of said shoe.

3. In a well drilling apparatus, a central operating casing, a concrete supporting shoe having a central spider thereon supporting the operating casing, and two sets of curb forming jackets adapted to form a curb above said shoe.

4. In a well drilling apparatus, an annular curb supporting shoe, a plurality of sets of curb forming jackets of diameters equal to the inner and outer diameters of said shoe, a central spider on said shoe, a casing supported by said spider, and drilling apparatus operating through said casing to remove the material under the same.

5. In a well drilling apparatus, an annular curb supporting shoe composed of a plurality of detachable segments, a detachable spider centrally secured to said shoe, a central casing resting on said spider, a plurality of curb forming jackets of diameters equal to the outer and inner diameters of said shoe, and a drilling rig operating through said casing to remove the material thereunder.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of April, 1907.

JOHN H. MILLIGAN.

Witnesses:
EDMUND A. STRAUSE,
TRIMBLE BARKELEW.