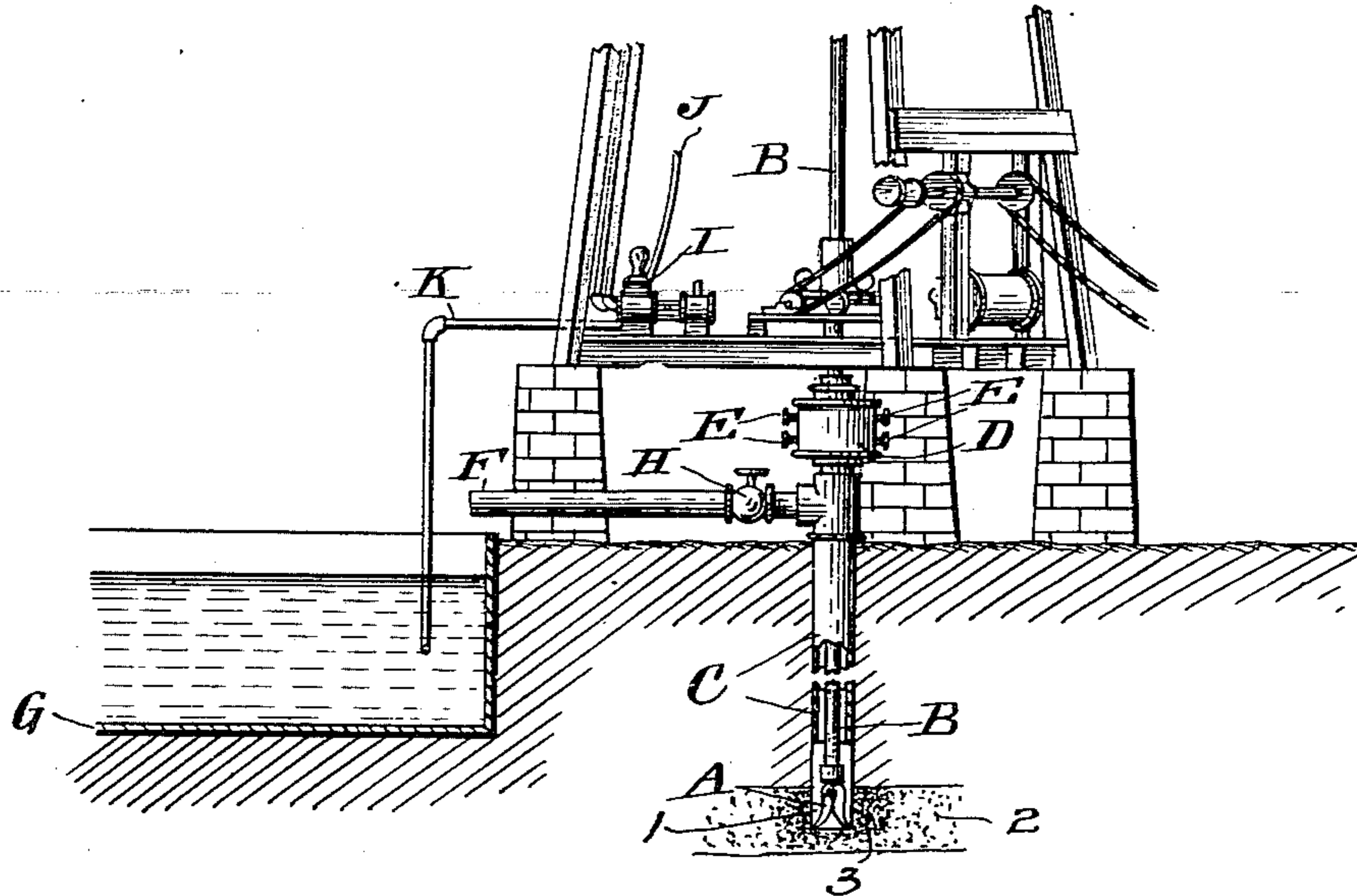


No. 834,367.

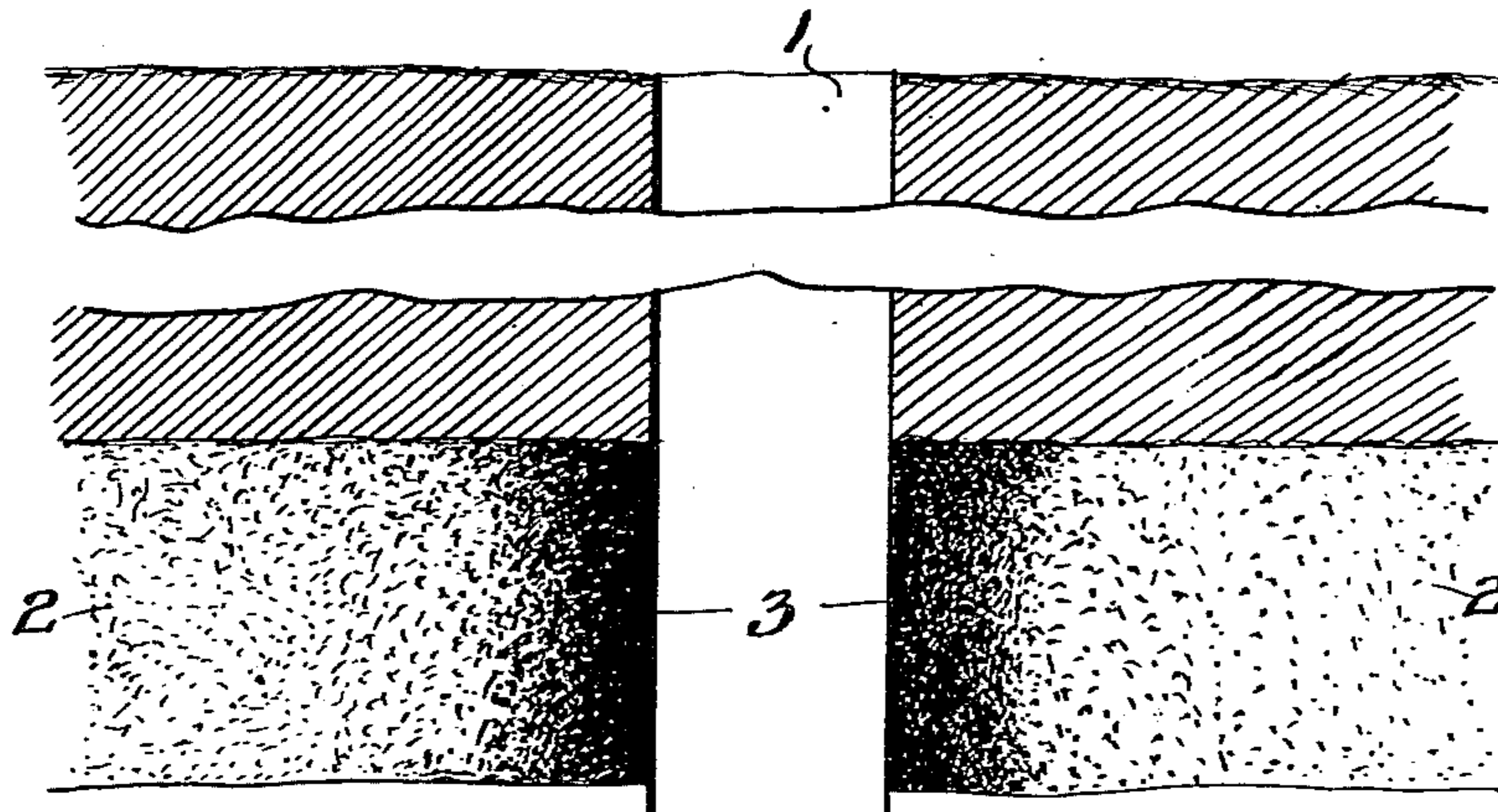
PATENTED OCT. 30, 1906.

H. R. DECKER.  
METHOD OF DRILLING WELLS.  
APPLICATION FILED AUG. 5, 1905.

*Fig. 1.*



*Fig. 2.*



Witnesses

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# UNITED STATES PATENT OFFICE.

HARRY R. DECKER, OF BEAUMONT, TEXAS.

## METHOD OF DRILLING WELLS.

No. 834,367.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed August 5, 1905. Serial No. 272,923.

*To all whom it may concern:*

Be it known that I, HARRY R. DECKER, a citizen of the United States, residing at Beaumont, in the county of Jefferson and State of Texas, have invented certain new and useful Improvements in Methods of Drilling Wells, of which the following is a specification.

It is found in drilling water and oil wells by what is known as the "rotary" process in the sections of this country formed by alluvial deposits that the greatest trouble and difficulties, and which have been considered unavoidable, are usually encountered in the upper or shallow portions of the wells while drilling through sand or other caving strata containing Artesian-water flow, gas under pressure, gravel, or "nigger-head" boulders.

When Artesian water is encountered, the flow purges the well of its mud-laden water, which it is necessary to use in effective drilling by the rotary process. The clear water flowing upward washes from the bore of the well the mud casing which has gradually been built up by the use of mud-laden water, and the walls of the well commence to cave in, which increases as the uninterrupted Artesian flow of clear water continues.

When gas is encountered having a pressure greater than the pressure exerted by the column of mud-laden water used in the process of drilling, its pressure necessarily lifts or forces the mud-laden water from the well. The gas thus secures for itself full and unrestrained vent or escape, and in nearly every case its terrific velocity rends asunder the walls of the well-bore, so that it becomes impossible to repair them, and they are frequently abandoned.

When gravel or nigger-head boulders are encountered, the constant agitation and washing tendency of the water being pumped through the drill-pipe to the point of the drill causes the gravel and stones to constantly funnel in and fall to the bottom of the well, either materially retarding and impeding the progress of the drilling or chocking the bore altogether.

It is found in drilling wells by the rotary process that the column of water used to flush the bore of the well exerts a pressure on the well proportioned to its depth and that when a sand stratum or soft formation is encountered this water penetrates the sand, and as the water contains mud in solution the particles of mud are filtered from the

sand and serve to form a conglomerate mud and sand casing proportioned in strength to the amount of mud held in solution and the pressure of the water determined by the height of the column. This conglomerate casing extends into the sand stratum on all sides of the bore of the well, being of the greatest density next to the bore and extending back into the stratum or pocket with decreasing density.

In ordinary cases when the well is at a great depth the weight of the water column is sufficient to drive the mud into the sand and form a casing having density enough to overcome its caving tendency, but when a pocket or stratum of sand or other soft formation containing an Artesian flow of water or containing gravel or stone is encountered at a lesser depth the pressure of the water column is not sufficient to form a solid casing of mud or conglomerate, and the bore becomes choked with the gravel or boulders, as above described.

My invention relates to drilling wells of the character above described and to form casings to hold back the sand, Artesian flow, gas, stone, and gravel in pockets or strata thereof when encountered at such a depth that the weight of the column of water is not sufficient to form a mud casing of proper density and strength and consists of the method hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is a view of a well-drilling machine used in carrying out my method, and Fig. 2 a view of a well-bore showing the application of my method.

The machine shown in Fig. 1 is the subject of a patent granted to me on July 7, 1903, No. 732,925, and will not be particularly described further than to briefly state the parts necessary to an understanding of my method. In said Fig. 1, A represents the drill-bit, secured to a tubular drill-rod B, and C the tubular casing that is lowered behind the drill-bit and forms the well-tube when oil or gas has been struck. At the top of casing C, I secure a housing D, in which are mounted valves operated by the screw-rods E for clamping the tubular drill-rod B and preventing the egress of water when desired. Just below housing D is a lateral outlet-pipe F, secured to the casing C and emptying into a tank or other suitable receptacle G. H represents a cut-off valve, which may be closed when desired to hold the column of

water in the well-bore for the purpose stated in said Patent No. 732,925 or for the purpose hereinafter stated. I represents a suitable pump connected, by means of hose or tubing  
 5 J, with tubular drill-rod B, said pump being supplied with water by means of pipe K.

In using my machine ordinarily a constant flow of water is maintained from the tank G through pipe K, pump I, hose J, drill-rod B  
 10 to the bottom of the well-bore, and then back through the casing C and out through pipe F to the tank G, washing out the borings as fast as they are made by the drill-bit. When a stratum or pocket of sand is struck which  
 15 threatens to choke up the well, as above described, the valves in the housing D are closed and also the valve H, thus closing the well except to the admission of water through hose J. The pump I is kept in operation,  
 20 thus increasing the pressure of the column of water in the well-bore and resulting in driving the water into the stratum of sand, which, acting as a filter, extracts the particles of mud held in suspension in the water and  
 25 forms a casing, as shown in Fig. 2. In said Fig. 2, 1 represents the well-bore, 2 the stratum of sand, gravel, &c., and 3 the mud casing formed by the method just described. The greatest density of the mud casing 3 is  
 30 immediately next to the bore 1 and decreases in density back from the bore until the presence of the mud ceases to be noticeable. This feature I have attempted to show by differences in shading in said Fig. 2.

35 It will be understood that as the water is used to carry off the borings of the bit A it always holds in suspension particles of mud from which the casing 3 may be built, but that, if desired, water containing a larger  
 40 percentage of mud in suspension may be fed to the pump, so as to more quickly form the casing 3 and insure a casing of greater density when necessary.

It will be understood that by employing  
 45 my improved process the expense of drilling

wells will be materially lessened, because it will now be unnecessary to abandon a well when a stratum of sand is encountered, which has frequently been the case in the past.

Having thus described my invention, what I claim is—

1. The method of forming a casing for wells consisting of filling the well-bore with a fluid holding plastic material in solution, sealing the top of the well-bore to the outflow of the  
 55 fluid, and then forcing more fluid into the well-bore to drive the fluid in the well-bore into the walls thereof, substantially as described.

2. The method of forming a casing for wells  
 60 consisting of filling the well-bore with a fluid holding plastic material in solution, sealing the top of the well-bore to the outflow of the fluid, and then forcing more fluid holding plastic material in solution into the well-bore  
 65 to drive the fluid in the well-bore into the walls thereof, substantially as described.

3. The method of forming a casing for wells consisting of filling the well-bore with fluid holding plastic material in solution, sealing  
 70 the top of the well-bore to prevent outflow of the fluid, and then pumping more fluid into the well-bore to increase the pressure of the liquid contained therein and to force it into the walls thereof, substantially as described.  
 75

4. The method of forming a casing for wells consisting of filling the well-bore with fluid holding plastic material in solution, sealing the top of the well-bore to prevent outflow of the fluid, and then pumping more fluid hold-  
 80 ing plastic material in solution into the well-bore to increase the pressure of the liquid contained therein and to force it into the walls thereof, substantially as described.

In testimony whereof I hereto affix my sig-  
 85 nature in the presence of two witnesses.

HARRY R. DECKER.

Witnesses:

D. WOODHEAD,  
 JNO. WOODHEAD.