May 26, 1931. H. P. STOLZ 1,807,050

METHOD FOR CEMENTING WELLS

Filed Dec. 26, 1928

Fig. 1

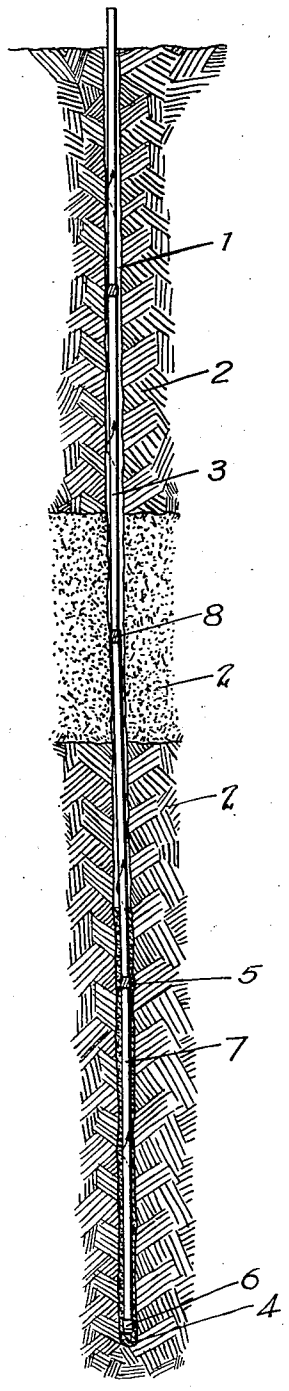


Fig. 3

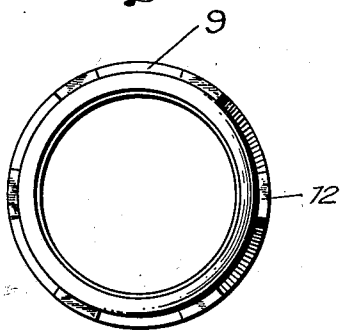
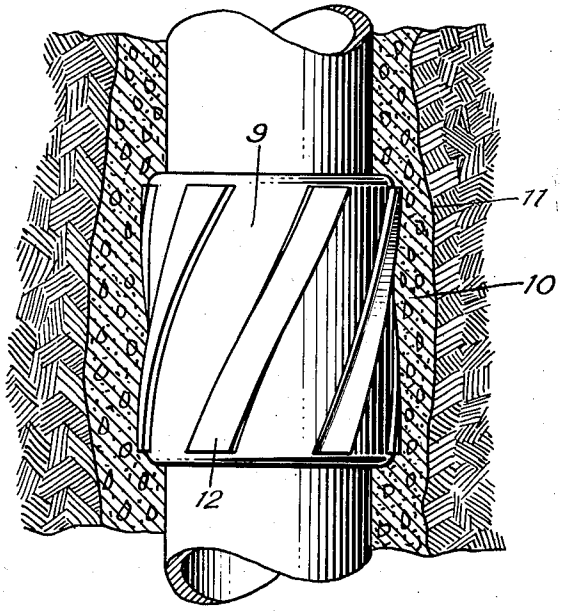


Fig. 2



INVENTOR.
Harry P. Stolz.
BY Lyon & Lyon
ATTORNEYS.

Patented May 26, 1931 1,807,050

UNITED STATES PATENT OFFICE

HARRY P. STOLZ, OF GLENDALE, CALIFORNIA

METHOD FOR CEMENTING WELLS

Application filed December 26, 1928. Serial No. 328,565.

This invention relates to the cementing of deep wells such as deep oil wells. In drilling such wells, a casing is let down into the well consisting of jointed sections of pipe. When water in quantities is encountered it is necessary to exclude the water by pumping liquid cement down the casing and permitting it to pass upwardly in the hole outside of the casing. Sufficient cement is introduced in this way to shut off the water, and after the cement hardens, the drilling is proceeded with by drilling through the hardened cement at the lower end of the casing and then setting in an inner casing of slightly smaller diameter than the first casing.

When water is encountered, as suggested above, if the casing were maintained in a central position at all levels in the well, the cementing operation would be comparatively simple.

As a matter of fact, however, due to crooked holes, and the great length of casing and the weight upon it, the casing is not at all points disposed centrally in the hole, but disposes itself along a wavy line, so that the side of the casing touches the face of the hole at a number of points, at different levels in the well. Under these circumstances, the upwardly flowing cement follows the lines of least resistance and flows upwardly on the side of the casing where the hole offers the greatest area of cross section. The result of this is that little or no cement may be deposited on the side of the casing touching the face of the hole. For this reason, many cementing operations fail, so as to necessitate several operations of re-cementing. These operations are costly not only as to the cost of the operations, but they delay the drilling operations.

The general object of this invention is to produce a method for cementing a well which will operate to insure the deposit of cement all around the casing, thereby increasing the efficiency and effectiveness of such cementing.

The invention consists in the novel steps and combinations of steps to be described hereinafter, all of which contribute to produce an efficient method for cementing a well.

The preferred embodiment of the method is described in the following specification. In the drawings which illustrate the practice of my method,

Figure 1 is a vertical section through the lower end of a deep well illustrating the casing within the same, and representing the cementing operation in progress.

Figure 2 is a vertical section upon an enlarged scale, taken at one of the joints of the casing and illustrating the manner in which my method operates to insure an effective cementing of the well.

Figure 3 is an end elevation of a joint or coupling which I employ for connecting the sections of pipe which form the casing.

In order to disclose the operation of my method, in the drawings, Figure 1 illustrates the bore or hole 1, of a deep well passed downwardly through different characters of strata 2 in the earth at the location of the well. Within the hole 1, a casing is let down as fast as the drilling proceeds. This drilling is accomplished by means of a drill bit located at the bottom 4 of the well. The casing, due to its own weight, disposes itself in a wavy line so that the casing touches the face of the hole 1 at points located at different levels in the well, for example, at the point 5 near the bottom of the well.

If water is encountered in the operation, the lower end of the string of casing is provided with a cement discharge head 6. In order to cement the well, liquid cement is forced down the interior of the casing 3 and permitted to escape at the discharge head 6, so that the cement flows upwardly in the hole 1 outside of the casing.

In practicing my invention, I develop a circumferential movement in the cement successively at different levels as the cement flows upwardly. In order to accomplish this, I connect the sections 7 of the pipe that make up the casing by means of couplings 8 having a special construction, operating to guide the upwardly flowing cement in a circumferential direction. In other words, as the cement flows upwardly, each coupling 8 gives the cement a circumferential movement. The effect of this is that at a point such as the point 5, where

the casing is up against the face of the hole, the cement exerts a scouring action on the adjacent face of the hole, thereby providing a passage for the cement and in this way, insures the deposit of cement between the casing and the face of the hole even where the side of the casing lies up against the side of the hole.

In order to accomplish this, I provide the outer side of the coupling with helical guide grooves 9. These grooves are all right hand or left hand, so that the couplings at successively higher levels, develop the same circumferential movement in the cement, thereby giving it a swirling action and insuring the deposit of cement on all sides of the casing. The degree of scouring action will of course depend upon the pitch of the helix along which the grooves are formed. Even if the pitch were very slight or imperceptible, this grooved coupling would be advantageous because it would operate to guide cement along the face of the coupling up against the face of the hole. It is preferable, however, to give the groove 9 considerable pitch, such as that illustrated in Figure 2. In this figure, 10 illustrates the cement deposited on the side of the coupling which was in contact with the face of the hole, the earth having been scoured back to a point indicated by the line 11.

The couplings may be constructed in any desired manner to enable them to produce the circumferential movement in the upwardly flowing cement. In this connection, it should be noted that in guiding the cement, the sides of the grooves are not subjected to any substantial strain and hence, the projecting portions of the coupling walls between the grooves can be formed by welding strips 12 of metal, disposed along a helical line. By forming the coupling in this way, an ordinary coupling can be employed and it will still have the requisite cross section.

If desired, however, the grooves can be formed by forming the coupling with the metal between the grooves integral with the body of the coupling.

By practicing my method, it will be evident that the upwardly flowing cement will not tend to pass the contact points of the casing and hole, only on the open side, but will be forced to move around onto the side of the casing in contact with the face of the hole and thereby attain the effects illustrated in Figure 2.

In cementing off above an oil sand, a combination string of casing can be employed permitting the cement to pass out through a cement discharge head just above the oil sand.

It is understood that the embodiment of the invention described herein is only one of the many embodiments this invention may take, and I do not wish to be limited in the practice of the invention, nor in the claims, to the particular embodiment set forth.

What I claim is:

1. The method of cementing a casing in a deep well, which consists in passing liquid cement down the casing and permitting the same to escape near the bottom of the well, so that the cement flows upwardly outside of the casing, and developing a circumferential movement in the flowing cement successively at different levels as the same flows upwardly.

2. The method of cementing a casing in a deep well, which consists in passing liquid cement down the casing and permitting the same to escape near the foot of the casing at the bottom of the well, so that the cement flows upwardly outside of the casing, and guiding the flowing cement in a circumferential path at different levels as the same flows upwardly.

3. The method of cementing a casing consisting of jointed sections in a deep well, which consists in passing liquid cement down the casing and permitting the same to escape at the foot of the casing near the bottom of the well, so that the cement flows upwardly outside of the casing, and developing a circumferential movement in the upwardly flowing cement at the joints between the sections of the casing.

Signed at Los Angeles, California this 18th day of December 1928.

HARRY P. STOLZ.