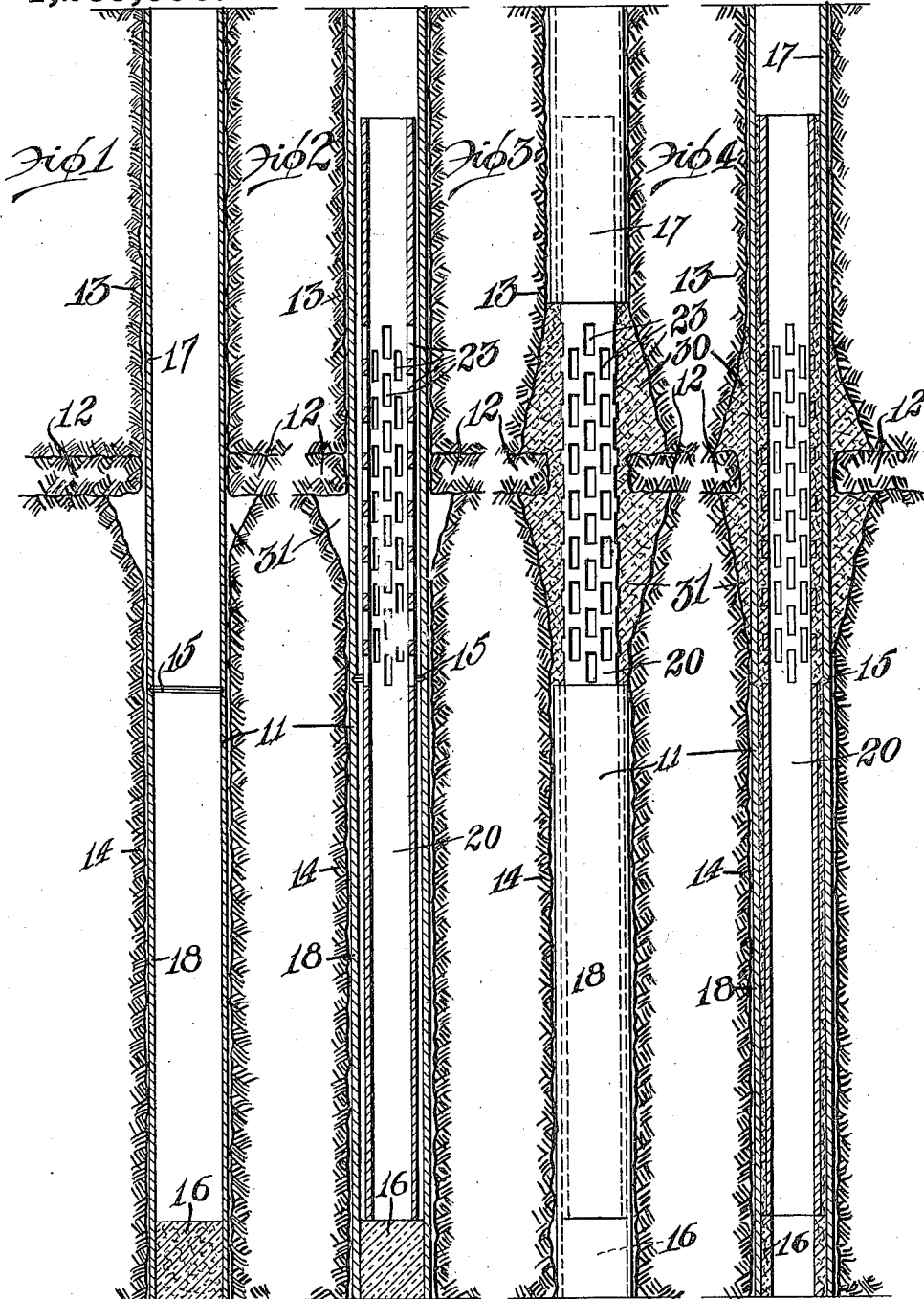


S. L. KISTLER.
METHOD FOR CEMENTING WELLS.
APPLICATION FILED APR. 20, 1917.

1,269,090.

Patented June 11, 1918.



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SAMUEL L. KISTLER, OF LOS ANGELES, CALIFORNIA.

METHOD FOR CEMENTING WELLS.

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Specification of Letters Patent.

Patented June 11, 1918.

Substitute for application filed November 15, 1915, Serial No. 61,691. Divided and this application filed April 20, 1917. Serial No. 163,528.

To all whom it may concern:

Be it known that I, SAMUEL L. KISTLER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Method for Cementing Wells, of which the following is a specification.

This application is a substitute for Serial No. 61,691, filed November 15, 1915 and abandoned February 15, 1917.

My invention relates to oil, water, gas and other wells. It is common practice to line oil wells with a metal casing, this casing passing down through the various strata into the oil sands from which the oil is derived or obtained. It is very common in the drilling of such wells to pass through water bearing strata, and the greatest loss in the petroleum industry to-day is due to the fact that this water finds its way into the oil bearing strata and into the various wells which are drilled therein. Any means by which the security of the oil well against the loss of the hole, and increase of water, can be secured, is therefore of great importance in the art. To provide this security it is the present practice to use cement, this cement being forced through the casing and up around the exterior thereof, hardening in place so as to shut off the flow of the water by cementing the casing to the rock structure through which it passes.

The principal object of my invention is to guarantee the alinement of the casing during the cementing of the well.

The method and apparatus is well illustrated in the drawing, in which Figures 1, 2, 3 and 4 represent successive stages in the drawing, the actual conditions in these stages being more fully set forth in the following description.

In these drawings, 11 represents an oil well casing of indefinite length, this casing extending downwardly through the bore of the well, being supported by a suitable means at the upper end. 12 represents a shell, as it is commonly called, of hard rock through which the casing passes, this shell having a formation of soft material 13 above, and a formation 14 of similar material below. The formations 13 and 14 may be loose sand, rock, or the like. It is sup-

posed that the formation 13 contains water, or that formations directly above it contain water, so that there is a seepage of water downwardly, (of course water can come from below upwardly, as is obvious, under reverse conditions, if a hole should be drilled through a water stratum below the point desired to be saved), around the casing 11, and through the opening in the shell 12, this water passing downwardly into the formation 14, and through the formation 14 into the oil bearing sands or into the interior of the well itself. The operator of the well wishes to introduce cement between the shell 12 and the casing 11 in such a quantity and in such a manner that an absolutely watertight joint will be formed between the casing 11 and the shell 12, the shell 12 being supposed to be of such a nature that water will not readily pass therethrough. The lower portion of the casing 11 may be of very considerable length, and it would be impractical to force the cement downwardly through the casing and upwardly between the formation 14 and the casing into the space around the shell 12. It is therefore necessary to provide a cut 15 in the casing which is then raised, a bridge 16 being first secured approximately in the location shown in the drawings. This bridge is formed in a variety of ways by the introduction of plugs of various kinds in the casing, and in some cases by the introduction of cement which hardens and completely closes the casing. By cutting the casing at the point 15 and raising it, it would be possible to force cement into the formations 13 and 14, and in and around the shell 12. As the formations 13 and 14 are supposed to be loose ones, and as the casing 11 may have considerable stresses due to a crooked hole or the like, it is very likely that when the casing is again dropped down that the upper portion 17 and the lower portion 18, which were divided by the cut 15, might not meet exactly, or indeed it is possible that the upper portion 17 would be sufficiently displaced by the side of the portion 18 so that the lower portion of the hole, or well, would be lost. To prevent this difficulty I provide a guide section 20. This guide 20 is provided with perforations 23. While these perforations are shown in the form of slots in the drawing, they may be round, square

or of any desired shape, or location, so long as they serve their purpose which will now be explained.

The method of drilling the well, using the guide 20, is as follows:

The portion 16 being placed at a desirable point in the casing 11, and being secured therein with water-tight relation with the casing, the groove 15 is cut in the wall of the casing, this groove however, not entirely separating the casing into two sections 17 and 18. The well at this time is in the condition shown in Fig. 1. The guide 20 is then placed in position, the parts being in the relation shown in Fig. 2. The operator then lifts, or twists, the upper section 17 of the casing, breaking the casing at the groove 15, and separating it into two parts. The upper part 17 is then raised by a suitable apparatus anchored at the surface into the position shown in Fig. 3. A part of the guide 20 remains in the section 18, and the balance of the guide is in section 17 and the space intermediate of sections 17 and 18.

With the parts in the position shown in Fig. 3, the cement is pumped downwardly inside the casing 17, passing through the guide perforations 23 into the channels of least resistance leading from the perforated guide 20. When the upper section 17 has been lifted it is generally found desirable to circulate water through the casing and upwardly around the upper portion thereof. This circulation of water will commonly form a pocket 30, above the formation so that a relatively large opening is left on the upper side of the shell 12. This space, as well as the interior of the guide 20, and a portion of the casing, is filled with cement. This cement may also surround the opening in the shell 12, on either side of the shell, and extending up and down inside the well for a considerable distance, (on either side of the shell), passing into and uniting in some degree with the formations 13 and 14. Before this cement has an opportunity to set, the upper section 17 of the casing is dropped back into its original position, and it is here that the great utility of the guide 20 is shown, as this guide positively insures that the sections 17 and 18 will meet in exact alinement. While the joint formed between the casings 17 and 18 is not absolutely water-tight in itself, the presence of the cement

inside and outside the joint insures a practical water-tight joint as soon as this cement has an opportunity to set. The mass of cement in the cavities 30 and 31, and in the space between the formation 12 and sections 17 and 18 of the casing 11, is then allowed to set. Drilling tools are then put into the well and the cement which is hardened inside the casing 11 and guide 20 is drilled out, the bridge 16 also being drilled out so that the bore of the well is again open and drilling operations may be resumed as indicated. The mass of cement in the cavities 30 and 31 adhering tightly to the casing 11, effectually holds the casing in alinement even if the guide 20 is removed. In many cases it is possible to pull the guide 20 from the hole by jarring it so that the bond with the cement is weakened.

I claim as my invention:—

1. The method of cementing wells which consists in placing a water-tight bridge in the casing below the point to be cemented, partially separating the casing near the point to be cemented, placing a guide in the casing on said bridge, said guide being of sufficient length to extend past the place at which the partial separation has been made, exerting force on said casing to cause it to separate, lifting the casing to enlarge the separation, pumping cement into the casing, lowering the casing to close the separation, allowing the cement to set, and clearing the interior of the casing of obstructions.

2. The method of cementing between an oil well casing and an impervious shell which consists in separating the casing near the shell, pumping cement into the space around the shell through the separation in the casing, lowering the casing to close the separation, and allowing the cement to set, the sections of casing on either side of the separation being held in alinement by a suitable guide.

3. The method of insuring the realinement of casing separated in cementing an oil well which consists in supporting inside the casing during the cementing operations an internal guide of sufficient length to bridge the separation.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 29th day of March, 1917.

SAMUEL L. KISTLER.