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(56) List of prior art documents: **Eremenko T.E. Kreplenie neftyanykh i gazovykh skvazhin. M.:Nedra, 1965, s. 159. USSR Inventor's Certificate № 261313, cl. E 21 B 33/14,1968. USSR Inventor's Certificate Ns 248589, cl. E 21 B 33/14, 1963. USSR Inventor's Certificate Ns 1263816, cl. E 21 B 33/14, 1988.**

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(54) A method for reverse cementing and design for the implementation of same

Sample of Russian to English translation

(57) Abstract.

The present invention relates to mining industry and is used for the cementing of wells. The object of the invention is to improve the quality of cementing. The essence of the method is that before a cement slurry is pumped into a well, a portion of a liquid containing a spherical filler is pumped in until the latter settles into the circulation holes, wherein in this process the spheres that are used as a filler are made from a metal or polymer with a density that is 15 – 20% higher than the density of the liquid into which the filler is introduced. The method is realized with the help of a design comprising a casing pipe, the lower part of which is equipped with a poppet-type check valve with the circulation holes. The number of the holes does not exceed 5 and their diameter is 15 – 25 mm depending on the casing pipe diameter. During the well cementing and before pumping in the cement slurry, a portion of the liquid that contains the spherical filler is pumped in and settles in the circulation holes. Spheres are used as the filler, and are made from a metal or polymer with a density that is 15 – 20% higher than the density of the liquid into which the filler is introduced. 1 drawing. 2 claims.

The present invention relates to the mining industry and can be used for the cementing of oil and gas wells.

A method is known for reverse cementing wherein after a calculated volume of cement slurry has been pumped into the annular space of a well and has reached the shoe of the casing pipe, slide valves at the wellhead are closed and the process of cementing is stopped.

A design for the reverse cementing of the casing pipes is known, and comprises an inverted valve with a plug seat in its upper part and a mechanism for opening a circulation channel during the cementing period.

The disadvantage of the known method is the impossibility of an exact determination of the point in time when the cement slurry flows into the casing pipe shoe and the height of its level in the annular space during the cementing, which makes it necessary to drill out the cement in the casing pipe, or results in the fact that the cement slurry does not reach the bottomhole.

The drawback of the indicated design is that it is impossible to control the height of the cement column in the casing pipe.

The method that is the most similar to the offered method is the reverse cementing wherein a portion of the liquid is pumped in before pumping in the cement slurry, where [said liquid] contains a fiber filler and a bridging filter placed at a given interval of the casing pipe.

The design that is the most similar to the offered design for the reverse cementing of casing pipes contains a hollow case with radial holes, a shoe of the casing pipe, a separating plug fixed in the case above the shoe and a plug seat for the bypass plug.

According to this method, a filter with small-diameter holes is used, since the filler fiber is forced through holes with large diameters, and the cement slurry penetrates into the casing pipe. A filter with small-diameter holes is prematurely clogged with sludge, which inevitably penetrates from the well walls when the casing pipe is lowered into the liquid that fills the well, with the result that the cement slurry does not reach the bottomhole.

The disadvantage of the indicated design is that the radial holes intended for the filler to settle therein are situated at an angle to the downstream direction. Under the action of inertial forces and their own weight, the spheres of the filler can slip past the holes and sink lower. In addition, even when the radial holes are shut off with the filler, the unutilized spheres penetrate into the circulation holes, which can cause the design to fail.

The object of the present invention is to improve the quality of well casings.

The object is achieved due to the fact that according to the method for the reverse cementing, wherein a portion of liquid is pumped in before the cement slurry, [said] liquid contains a spheroidal filler that is subsequently set in the circulation holes; the spheres used as a filler are made from a metal or polymer with a density that is 15 – 20% higher than the density of the liquid into which the filler is introduced.

The design for the implementation of the offered method includes a casing pipe with a poppet-type check valve and circulation holes, which are in the disk of the poppet-type check valve and do not exceed 5 in number; the diameter of the circulation holes is equal to 15 – 25 mm depending on the casing pipe diameter.

The circulation holes are located in the main direction of the liquid flow, which guarantees reliable clogging of the holes with the filler spheres and provides minimal hydraulic losses.

Because of the small quantity of the spheres required for reliable clogging of the holes (20 – 30 spheres), and their significant size, they do not influence the density and rheological parameters of the liquid.

The drawing presents the design for the realization of the offered method.

The method for reverse cementing is implemented in the following manner.

During the reverse cementing with the cement slurry, a portion of the liquid that contains spheroidal filler 1 that later settles into circulation holes 2, is pumped in before the cement slurry. The spheres used as the filler are made from a metal or polymer with a density that is 15 – 20% higher than the density of the liquid into which the filler is introduced.

A design for the implementation of the offered method includes casing pipe 3 with poppet-type check valve 4 and circulation holes 2, which are in the poppet-type check valve disk and do not exceed 5 in number; the diameter of the circulation holes is 15 – 25 mm depending on the casing pipe diameter.

Claims

1. A method for reverse cementing comprising a portion of liquid that contains a spherical filler being pumped in before a cement slurry and subsequent settling of the filler into circulation holes, wherein in order to improve the quality of cementing, the spheres that are used as a filler are made from a metal or polymer with a density that is 15 – 20% higher than the density of the liquid into which the filler is introduced.

2. A design for the reverse cementing comprising a casing pipe with a poppet-type check valve and circulation holes, wherein the circulation holes are in the poppet-type check valve disk and their number does not exceed 5 and the diameter of the circulation holes is taken to be 15 – 25 mm.