July 26, 1938. J. E. PIPES 2,124,710

WELL CEMENTING PLUG

Filed March 17, 1937

FIG. 1.

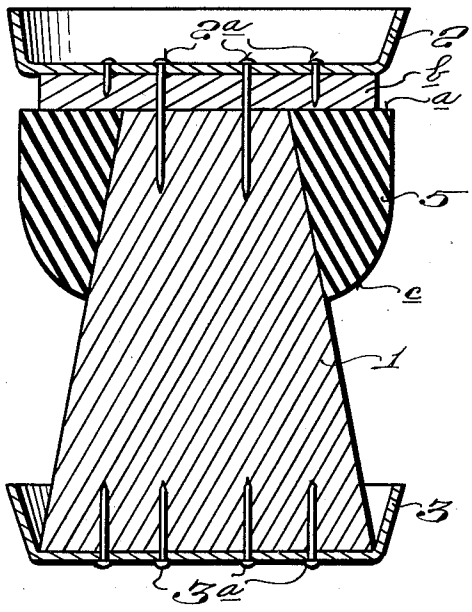


FIG. 2.

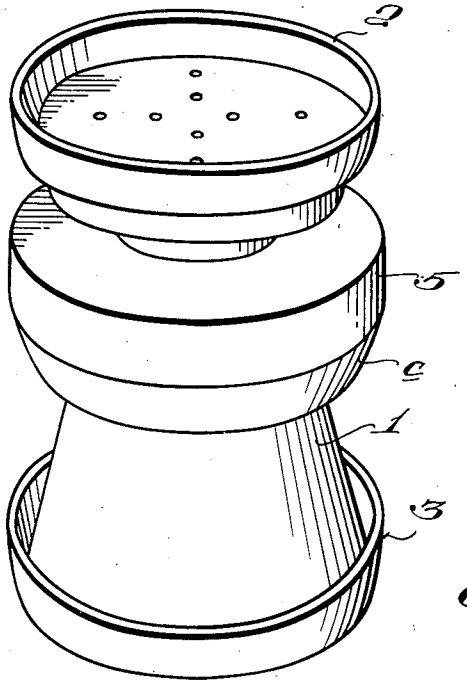
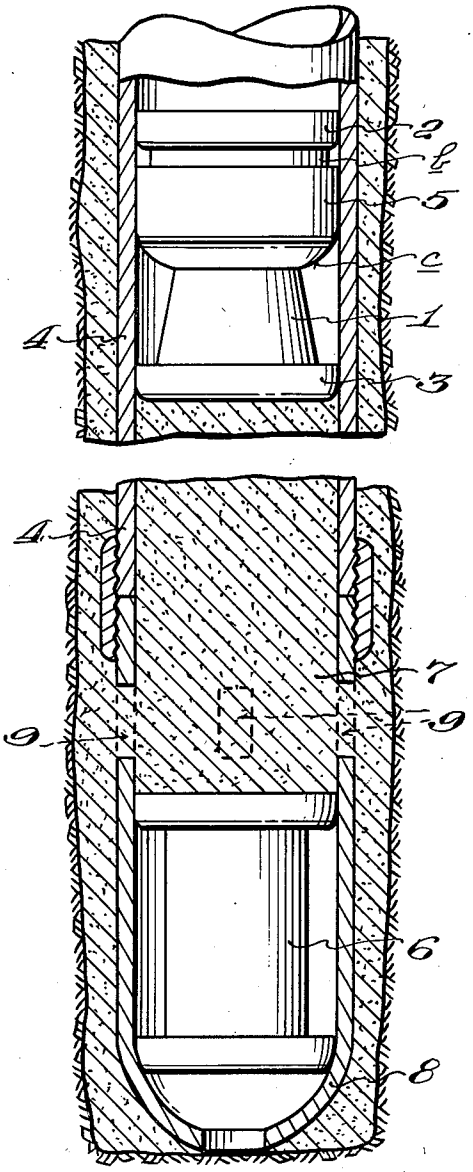


FIG. 3.



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WELL CEMENTING PLUG

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2 Claims. (Cl. 166—1)

This invention relates to the art of cementing wells and it refers especially to a plug used in connection with a well cementing operation.

The principal object of the invention is to improve upon the present practice of cementing oil and other wells by providing means to insure against rising of the cementitious material in the well casing, once it is introduced thereinto, and prior to a mechanical set. The present invention anticipates the provision of a follower plug, disposed upon the column of cementitious material and upon which is imposed fluid pressure from the surface, to force the plug and consequently the introduced cementitious material to a point in the well, designed to set the well casing and to close out any foreign fluids.

Another object of the invention is to provide a plug which will set itself in a well casing against back pressure and will resist the effects of any medium therebelow to displace the same in a well casing.

Another object of the invention is to provide a cementing plug whose construction is such that it may be readily drilled out without injury to the drilling equipment, when it is desired to proceed with the drilling operation, after cementing.

With the foregoing objects as paramount, the invention has particular reference to its salient features of construction and arrangement of parts which will become manifest as the description proceeds, taken in connection with the accompanying drawing, wherein:—

Figure 1 is a vertical section of the plug of the invention.

Figure 2 is a perspective view, and

Figure 3 is a vertical section of the plug applied.

Continuing with a more detailed description of the drawing, the reference character 1 designates a plug, constructed of any soft material which may be disentegrated by a drill. This plug is of trunco-coniform shape, with its apex capped by a flexible washer 2 of leather or other material which may be considered the equivalent thereof and secured by nails 2^a.

On the base of the plug 1 is applied, by means of nails 3^a, a washer 3 similar to the washer 2 and which serves a similar purpose, inasmuch as it maintains contact of the plug at all times, against the walls of the confining surface, which, in the present case is comprised of the casing 4.

Surrounding the body of the plug 1 is a resilient ring 5, which may be constructed of rubber or its equivalent. This ring has a flush surface *a*, engaging with a flange *b* secured to the body 1. The lower edge of the ring 5 is deflected at *c* so that it will not engage with any projection in the casing to interfere with its downward movement through the casing 4.

Accordingly, in cementing a well, a lead plug 6 is usually pumped against the mud in the casing to force the same, down through the casing, out into the hole in advance of the cement 7, which latter is introduced into the well casing with a water mixture and thoroughly agitated prior to its introduction.

Suspended on the lower end of the casing string 4 is a shoe 8, in which there is provided ports or windows 9, through which the mud, and later the cement 7, is pumped into the hole from the casing 4, and upward between the walls of the latter and of the hole to a point desired, to seal off water and to anchor the casing firmly in the bottom of the hole.

The follower plug of the present invention is deposited on the column of cement in the well whereupon water, under pressure is employed to force the plug against the cement, driving the same downward into the casing and through the ports 9 of the shoe 8, as described.

When the lead plug 6 reaches the shoe 8, it is stopped thereby, but since it is moved therein to a point below the ports 9 in the shoe, cement continues to be forced into the hole by the follower plug and the pressure thereabove.

However, when the follower plug 1 of the invention overtakes the plug 6 it is stopped thereby and this fact is at once made apparent at the surface by reason of a sudden increase in pressure shown on the pressure gauge.

Pressure is then relieved on the plug 1 of the invention but it is apparent that it will not be influenced by any back pressure exerted by the fluid or cement therebelow to rise in the casing, due to the expansible ring 5. Any tendency in this direction causes the tapered body, upon slight upward movement to expand the ring 5, causing its outer surface to grip the inner walls of the casing 4 with a force increasing in accordance with the degree of pressure imposed upon the lower end of the plug.

Conventional cementing plugs, which are not constructed to resist upward movement of pressure thereunder, have no effect in preventing the accumulation of cement in the well casing. In many instances, where no precautions are taken, the cement, rises many feet in the casing, all of which is required to be drilled out after having obtained a mechanical set. The present invention prevents this. Moreover, the plug of the present invention maintains the body of cement

in a state of quiescence which is a desideratum for proper setting thereof. If it is permitted to move even slightly, a firm and desirable set is unobtainable.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. In a well cementing plug arranged for introduction in a well casing the combination comprising a truncated coniform body having a disc-like member affixed to its smallest end, flexible packing means secured to said disc and to the base of said body to overreach the edges thereof and a resilient ring conforming to said body and disposed intermediate its ends and capable of expansion upon slight upward movement of said body in said casing, said resilient ring being beveled at its lower end.

2. In a well cementing plug the combination comprising a body arranged for introduction into a well casing and having a trunco-coniform shape, flexible disc packing means affixed to the ends of said body and a ring of expansible material disposed intermediate the ends of said body and conforming thereto whereby to expand against said well casing upon slight upward displacement of said body, the said ring having a beveled lower end to effect its guidance into the well casing.

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