Jan. 7, 1969 J. R. BEYLIK 3,420,309

METHOD OF LINING WATER WELLS AND APPARATUS THEREFOR

Original Filed Nov. 26, 1963

Fig. 1

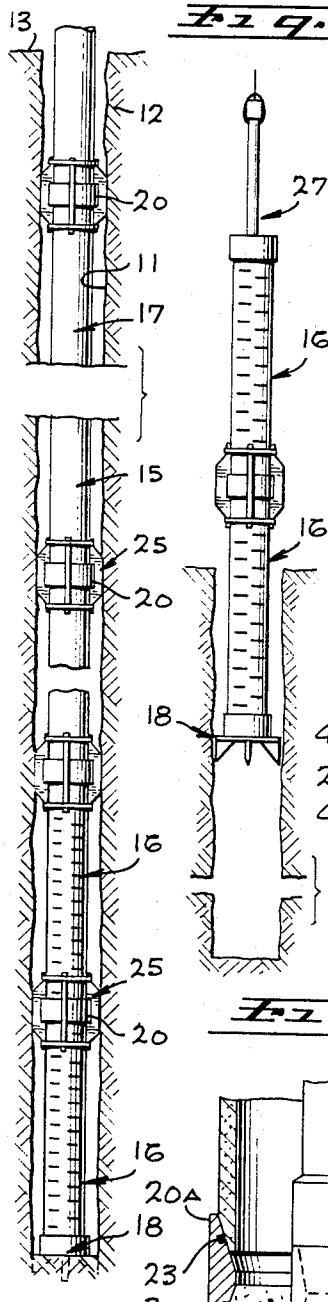


Fig. 2

Fig. 4

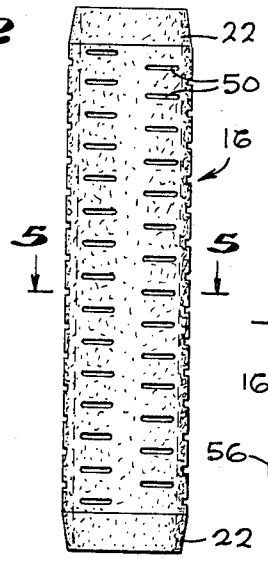


Fig. 8

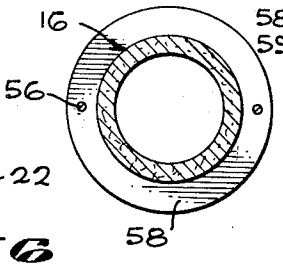


Fig. 7

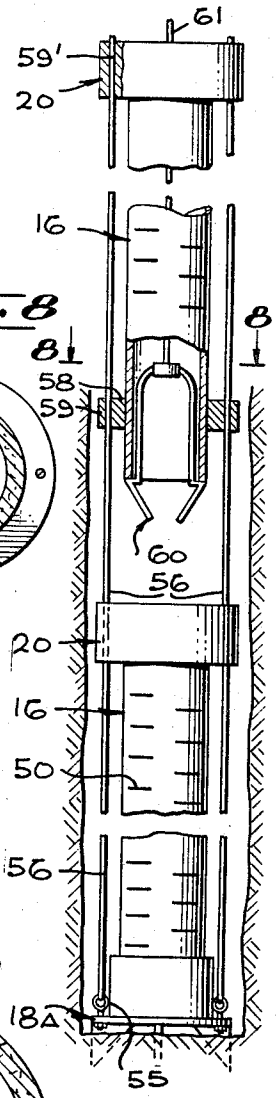


Fig. 6

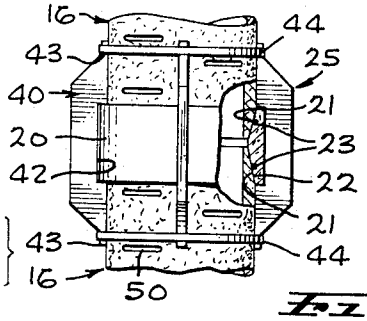


Fig. 5

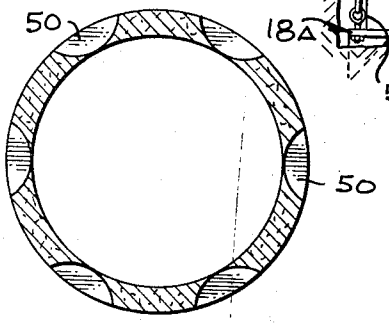
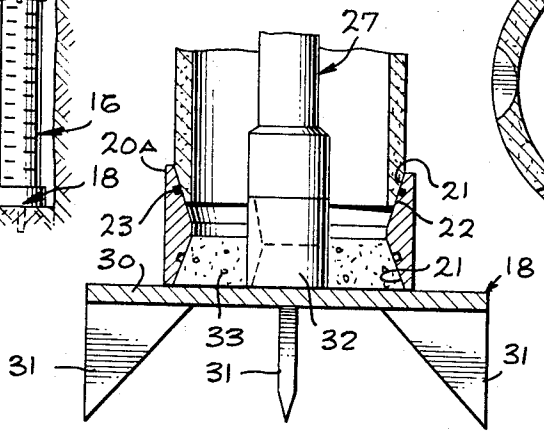


Fig. 3



INVENTOR.
JOHN R. BEYLIK
BY Mason & Graham
ATTORNEYS

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METHOD OF LINING WATER WELLS AND APPARATUS THEREFOR

John R. Beylik, 11118 Luitwieler Ave., Whittier, Calif. 90604

Original application Nov. 26, 1963, Ser. No. 326,035, now Patent No. 3,275,081, dated Sept. 27, 1966. Divided and this application Aug. 17, 1966, Ser. No. 573,116
U.S. Cl. 166—242 3 Claims
Int. Cl. E21b 17/14

ABSTRACT OF THE DISCLOSURE

A device on which casing is supported for lowering into place in a well and thereafter supported thereon which includes a circular plate with a tool joint on its upper side surrounded by a collar to receive the casing and sharp projections depending from the underside designed to enter the ground.

This invention has to do generally with the lining of water wells with noncorrosive casing and with methods of setting or landing casing in the wellhole.

This application is a division of my copending application, Ser. No. 326,035, filed Nov. 26, 1963 now U.S. Patent No. 3,275,081.

The invention is concerned with the lowering and handling of several lengths of casing into a well wherein the casing is of a type which cannot be suspended in tension from its upper end and with the provision of means for doing this in the form of what is termed a landing plate.

It is an object of the invention to provide a novel and improved means for landing casing in the form of a landing plate which may be lowered on the end of a drill pipe or the like with the casing resting thereon and which incorporates means of a novel nature for anchoring the plate once it comes to rest at the bottom of the well to facilitate uncoupling of the drill pipe.

Other objects will be apparent from the drawing and the following description. Referring to the drawing:

FIG. 1 is a diagrammatic view of a string of casing in place in a well, with the ground in section;

FIG. 2 is a view in section through the ground showing the wellhole fragmentarily and showing the lowering of the casing into the well;

FIG. 3 is an enlarged central sectional elevational view of the landing plate showing a casing seated therein and the drill pipe coupled thereto;

FIG. 4 is an elevational view of a perforate casing or liner section;

FIG. 5 is a sectional view on line 5—5 of FIG. 4, but on a larger scale;

FIG. 6 is an enlarged elevational view of a joint between casing sections and showing the centering means, the view being partially in section;

FIG. 7 is a diagrammatic view of a well showing a method of landing casing therein by means of a cable; and

FIG. 8 is an enlarged cross sectional view of a special casing joint collar.

More particularly describing the invention, referring first to FIGS. 1 to 6, numeral **11** designates a well or bore hole in the ground **12**, the surface of the ground being indicated at **13**. A string or length of casing designated generally by **15** is shown within the well and this includes several perforate sections **16** and imperforate sections **17**. The casing is shown resting upon what will be termed a landing plate **18** at the bottom of the well. Numeral **20** designates the casing joint collars between the individual casing sections and these have flared interior surfaces **21** to receive the beveled ends **22** of the casing sections. The collars also are provided with seal rings **23**. Preferably at each joint I provide means **25** for centering the casing in the well and stiffening the joint.

In the lining of water wells where the water is highly corrosive, I provide a lining or casing made up of a plurality of sections **16** and **17** of a noncorrosive material and preferably of asbestos-cement pipe or tubing. The collars **20** are made of the same material. Due to the fact that the individual sections are received in the collars by what may be termed merely a push fit, the casing is of course not self-supporting in tension in the sense of being capable of being suspended as it is lowered into the well, and therefore it is a principal feature of my invention that I lower the casing or suspend it on the regular steel drill pipe, designated by numeral **27**, and this in turn is handled in the conventional way by means of a rotary table, derrick and the conventional hoisting apparatus (not shown). In order to accomplish this, I provide the aforementioned landing plate **18**. This comprises a circular or other shaped plate-like body **30** provided with downwardly extending sharp projections **31** which have been shown as triangular plates, although other types of projections might be used. At the center of the plate on its upper side I provide a conventional drill pipe tool joint or box **32** which is secured by welds, and, concentric with this, a collar **20A** which is in all respects the same as the collars **20** between sections of the casing. To anchor the collar in place, I provide a body of concrete **33** in the space between the lower half of the collar and the tool joint member **32**.

In carrying out my method, with the landing plate **18** at the region of the surface of the ground **13**, I rest one or more sections of casing (**16** and **17**) thereon, the lowermost section fitting into the collar **20A** of the landing plate as shown in FIG. 3. I then attach the drill pipe to the landing plate (or this may be attached first if more convenient) and lower the assembly partway into the well. Subsequently then additional lengths of casing are added as are additional lengths of the drill pipe so that the whole assembly is intermittently advanced or lowered into the well as the sections of casing and drill pipe are added. It will be understood, of course, that the drill pipe is supported at one point near the surface of the ground as by slips in a rotary table or the like when the upper end is uncoupled from the conventional traveling block of the derrick hoisting equipment in order to add the additional section or sections of casing and drill pipe. Ultimately the landing plate **18** reaches the bottom of the bore hole or well and, due to the weight of the casing and drill pipe thereon, the projections **31** are driven into the ground and then serve to anchor the plate against rotary movement. The drill pipe can then be uncoupled from the tool joint **32** since it may be unthreaded therefrom because the landing plate is anchored in the earth against turning.

As the sections of casing are made up with the collars **20** therebetween, I provide the means **25** for centering the casing in the well. This means comprises a plurality of members **40** which may be of wood or other suitable material, each having an elongated body **41** with a recess **42** on its inner edge to freely receive the collar. The ends **43** are of reduced size and the various members **40**, of which there should be at least three at each joint, are held together by circumferential straps **44** of a suitable corrosion-resistant metal, such as stainless steel. Ultimately the space between the wall of the bore hole and the casing is filled with gravel, not shown.

As previously indicated, the individual casing sections **15** are made of a standard or conventional asbestos-cement pipe. The perforate sections **16** are of the same material but provided with a plurality of transverse slots **50**

and these are arranged in longitudinal rows as best seen in FIG. 4, with the slots in one row staggered relative to those in the other row in order to provide maximum strength. The rows of slots are also spaced substantially circumferentially of the casing to provide an unbroken beam section of casing extending from end to end. Preferably the slots are formed as shown in FIG. 5 to be relatively wide at their outer ends and relatively narrow at their inner ends. This can be accomplished by using a circular saw on the outside of the casing to provide the slots.

Referring now to FIGS. 7 and 8, in some cases it is necessary to lower the casing sections **16** and **17** one or two at a time on a line or cable. To accomplish this, I first lower a landing plate **18A** on the drill pipe with several sections of casing and then withdraw the drill pipe from the well. In this case, however, the landing plate is first provided with eyes **55** or the like to which guidelines **56** are secured. These guidelines are payed out as the landing plate is lowered in the well and are suspended in any suitable manner at the surface of the ground. The last casing lowered into the well on the landing plate is provided with a joint collar **20** at its upper end before the casing is lowered into the well. The collar should be cemented in place to prevent its separation from the casing proper and this may be done by an epoxy resin cement or other suitable substance.

Subsequent casings to be lowered into the well are provided at their upper ends with a joint collar **20** cemented in place and at their lower ends with a special guide collar **58** having axial holes **59** spaced diametrically so as to receive the guidelines **56**, respectively. Holes **59'** are also provided in the collars **20**. The guidelines are threaded through the special guide collars **58** and regular collars **20** and the casing is lowered into the well by means of a tool **60** on the lower end of a cable or line **61**. This tool is of a type which automatically disengages itself from the casing when it enters the casing already in the well.

It will be apparent that as the new casing section is lowered on the line, it will necessarily be guided accurately into the joint collar **20** at the upper end of the casing in the hole by the guidelines **56**. Other casings can then be lowered one or two or more at a time in the same manner.

Although I have shown and described preferred forms of my invention, I contemplate that various changes and

modifications can be made therein without departing from the invention, the scope of which is indicated by the following claims. By way of example, it is not necessary that the slots **50** of casing sections **16** be staggered or heretofore described.

I claim:

1. In means for installing an asbestos-cement type casing in a wellhole, a landing plate adapted to be lowered in the well on a string of drill pipe to rest on the bottom of the wellhole, a tool joint section mounted centrally of the plate on the upper side thereof to which the lower end of the drill pipe can be releasably joined, a casing joint collar mounted on said plate to receive the lower end of a section of casing, and downwardly extending projections on said plate adapted to enter the ground under the weight of the casing whereby to anchor the landing plate against rotation and enable subsequent uncoupling of the drill pipe therefrom.

2. The means set forth in claim **1** in which said landing plate is metal and has downwardly extending sharp projections, and in which a body of concrete fills the space between the casing joint collar and the tool joint section.

3. In means for installing an asbestos-cement type casing in a wellhole, a landing plate adapted to be lowered in the well on a string of pipe to rest on the bottom of the wellhole and of a diameter at least as large as the casing, a tool joint section mounted centrally of the plate on the upper side thereof to which the lower end of the string of pipe can be releasably joined, and downwardly extending projections on said plate adapted to enter the ground under the weight of the casing whereby to anchor the landing plate against rotation and enable subsequent uncoupling of the drill pipe therefrom.

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JAMES A. LEPPINK, *Primary Examiner.*

U.S. Cl. X.R.

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