

Jan. 23, 1934.

S. E. MANNING

1,944,442

CEMENTING APPARATUS

Filed July 6, 1931

2 Sheets-Sheet 1

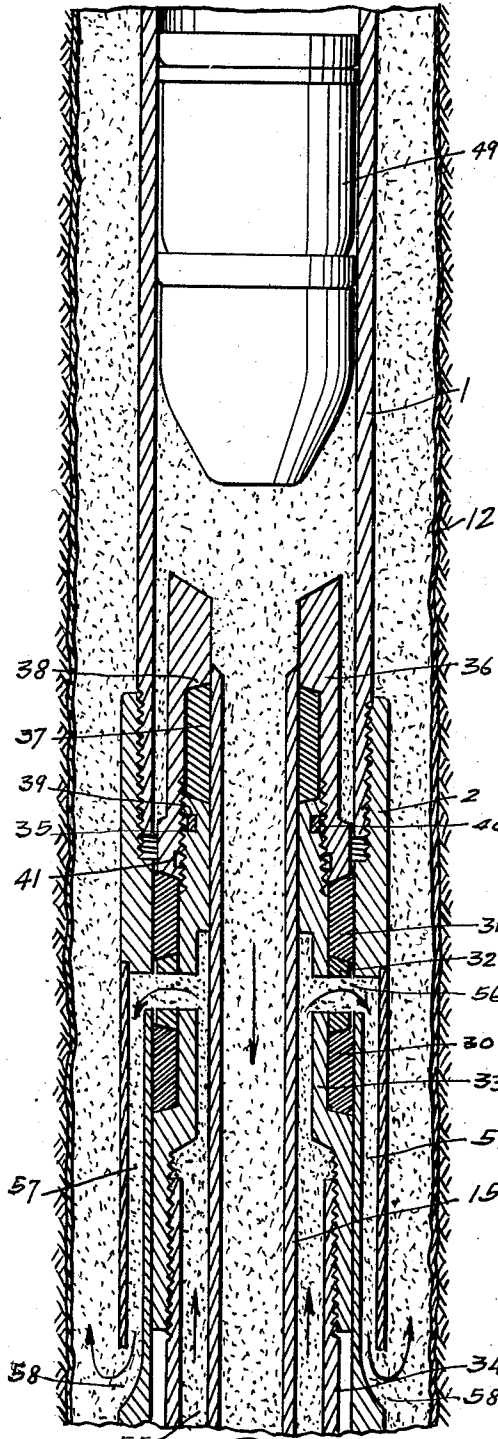


Fig. 1.

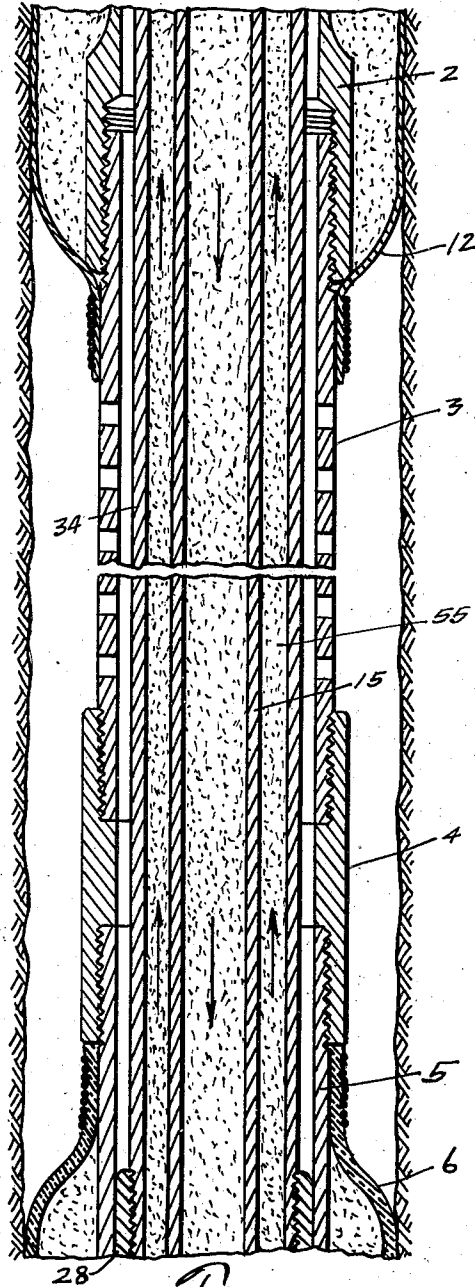


Fig. 2.

Inventor

Sanford E. Manning, deceased
by Mrs. S. E. Manning, Administratrix

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Hardway & Catter
Attorneys

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2 Sheets-Sheet 2

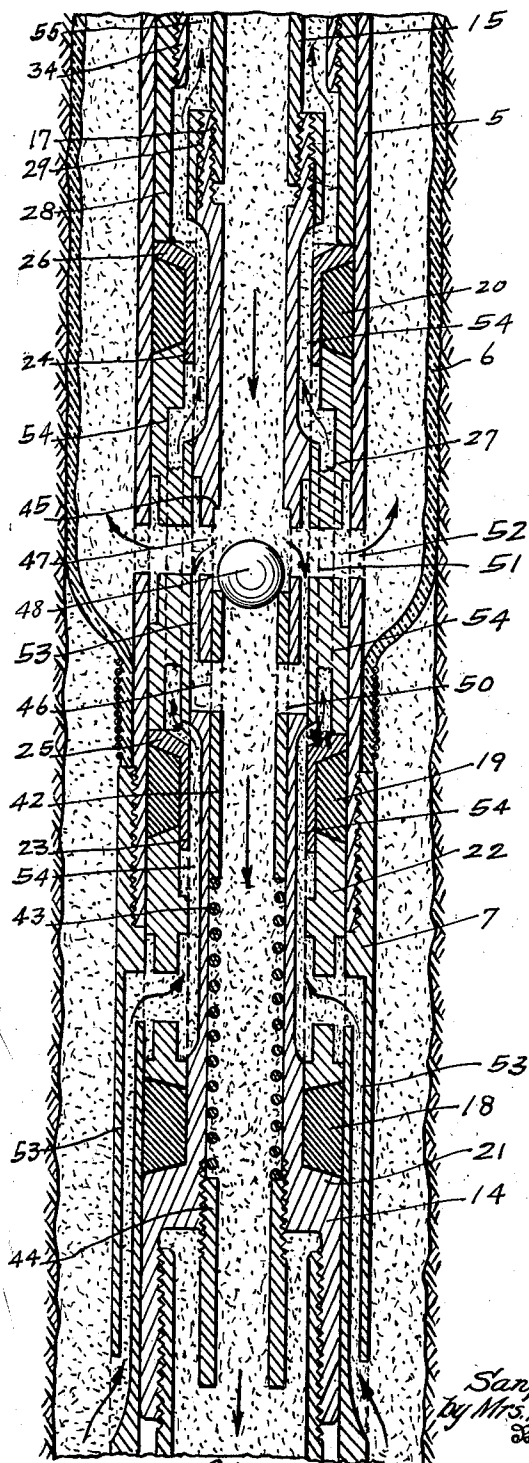


Fig. 3.

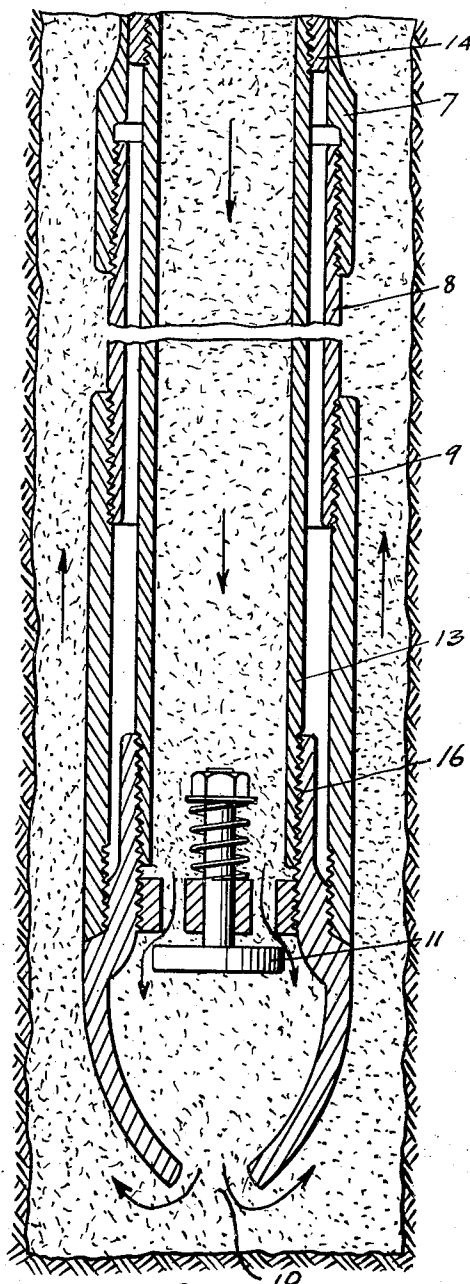


Fig. 4.

Inventor

Sanford E. Manning, deceased
by Mrs. S. E. Manning, Administratrix

Hardway & Cather
Attorneys

UNITED STATES PATENT OFFICE

1,944,442

CEMENTING APPARATUS

Sanford E. Manning, deceased, late of Houston,
Tex., by Mrs. S. E. Manning, administratrix,
Houston, Tex.

Application July 6, 1931. Serial No. 548,817

17 Claims. (Cl. 166—1)

This invention relates to cementing apparatus.

One object of the invention is to provide apparatus of the character described specially designed for the purpose of cementing a screen 5 in a well bore.

Another object of the invention is to provide apparatus of the character described whereby plastic cementitious material may be introduced into a well bore and collected into the space between the screen and the walls of the bore at the upper and/or lower ends of the screen to seal off water stratum above and/or beneath the oil bearing stratum opposite which the screen is set.

Another object of the invention is to provide 15 cementing apparatus of the character described whereby the cement may be introduced into the bore and allowed to set to form surrounding barriers adjacent the upper and/or lower ends of the screen to seal off water from above and beneath all at a single operation.

Another object of the invention is to provide apparatus of the character described assembled with the screen and setting string of such construction as to exclude all cement from the screen 25 during the cementing operation and which may be removed from the screen after the cement has set and it is desired to bring the well in.

The invention herein disclosed comprises certain improvements over that disclosed in the 30 application of said Sanford E. Manning on Apparatus and process for cementing wells, Serial No. 499,989, filed December 4, 1930.

With the above and other objects in view the invention has particular relation to certain novel 35 features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a vertical sectional view of the 40 upper end of the apparatus.

Figure 2 shows a vertical sectional view of the screen and adjacent parts.

Figure 3 shows a vertical sectional view of an intermediate section located beneath the screen, 45 and

Figure 4 shows a vertical sectional view of the lower end of the apparatus.

Referring now more particularly to the drawings wherein like numerals of reference designate 50 similar parts in each of the figures the numeral designates a tubular setting string of pipe to the lower end of which the elongated special coupling 2 is attached and connected to the lower end of this coupling is the tubular screen 3 of 55 any selected design.

Connected to the lower end of the screen by the coupling 4 there is a tubular support 5 surrounding which there is a flexible sack like container 6 whose upper and lower ends respectively are secured to the upper and lower ends of the said support 5. Suitably attached to the lower 60 end of the support 5 there is an elongated special coupling 7 whose lower end is screwed on to the pipe 8 which in turn is connected at its lower end to a conventional set shoe 9 whose lower end has 65 the outlet opening 10 controlled by a back pressure valve 11 of any selected design.

There is a flexible sack like container 12 whose lower end is secured around the upper end of the screen beneath the coupling 2 and this container 70 extends any desired distance upwardly and its upper end may be open.

There is a cement conducting tube having the lower section 13, the intermediate section 14 and the upper section 15. The lower section 13 of 75 this tube is connected by left hand threads 16 into the set shoe 9 and the intermediate section 14 of said tube is connected to the upper end of said lower section 13. The lower end of the upper section 15 of said tube is connected by left hand 80 threads 17 into the upper end of the section 14 and this upper section 15 extends up axially through the coupling 2.

Around the intermediate section 14 are the lower intermediate and upper packing rings 18, 85 19 and 20, respectively, formed of suitable expansible material. The lower packing ring 18 is seated on a suitable external annular shoulder on the intermediate tube section 14 and between the packing rings 18, 19 there is a suitable spacer 90 sleeve 22 which surrounds the intermediate section 14 and fits closely within the lower end of the support 5 and the coupling 7 attached thereto. Fitted within the packing rings 19, 20 respectively are the glands 23, 24 whose upper ends 95 have the outwardly turned flanges 25, 26 which rest against the upper ends of the corresponding packing rings 19, 20.

There is a spacer sleeve 27 fitted closely with the tubular support 5 whose lower end abuts the 100 flange 25 and whose upper end is fitted around the gland 24 and abuts the packing ring 20.

There is a coupling 28 which is connected onto the upper end of the intermediate tube section 14 by means of left hand threads 29 and the lower 105 end of this coupling abuts the upper end of the flange 26.

Within the upper coupling 2 there are the expansible lower and upper packing rings 30, 31 which are held spaced apart by the annular 110

spacer ring 32. These packing rings 30, 31 and the spacer ring 32 are fitted within said coupling 2 and closely surround an inside coupling 33 whose lower end is screwed onto the upper end of a length of pipe 34 and the lower end of this pipe 34 is screwed into the upper end of the coupling 28.

Connected onto the upper end of the coupling 33 by means of left hand threads 35 there is a tubular nipple 36 whose lower end abuts the upper packing ring 31 and through which the upper tube section 15 extends. Surrounding the upper end of this tube section 15 there is a packing ring 37 which is confined between the inside annular shoulder 38, of the nipple 36, and the upper end of the coupling 33.

Confined within an external annular groove 39, around the upper end of the coupling 33 there is an expansible ring 40 and beneath the groove 39 there is an internal annular groove 41 around the lower end of the nipple 36 all for a purpose to be hereinafter explained.

Fitted closely within the intermediate tube section 14 there is a sleeve valve 42 whose lower end is seated on a strong coil spring 43 and this coil spring in turn is supported on the upper end of the nipple 44 which is screwed into the intermediate tube section 14, which is shown in Figure 3, and normally, the spring 43 holds the upper end of the valve 42 against the inside annular seat 45 above. The valve in this position will close the outlet ports 46, 47 through the walls of the intermediate section 14.

The apparatus is assembled as hereinabove described and then let down into the well bore to the bottom thereof. Washing fluid may then be forced down through the setting string and will pass on down through the conducting tube formed of the sections 15, 14 and 13 past the back pressure valve 11 out through the opening 10 and up about the screen and setting string to the ground surface and the screen 3 may thus be washed clean. A ball 48 is then dropped through the setting string 1 and will pass on down and land on the upper end of the sleeve valve 42.

A load of plastic cementitious material is then placed in the upper end of the setting string 1 and a plug like plunger 49 is inserted above said load and fluid under pressure is then applied against the upper end of said plunger preferably by pump, and the plunger and the load of plastic material ahead of it are forced downwardly and said material will pass on down through the conducting tube and the pressure against the ball 48 will force the sleeve valve 42 downwardly opening the ports 47 and aligning the lateral ports 50 through said valve, with the ports 46 of the intermediate section 14. A portion of the cementitious material will pass out through the ports 47 and through the ports 51, 52 through the spacer sleeve 27, and the tubular support 5 respectively into the lower container 6, filling said container and expanding it against the walls of the bore and a portion of said cementitious material will pass through the bypass channels 53 leading downwardly between the spacer sleeve 27 and the intermediate tubular section 14 and will pass thence in through the ports 46 and 50 and on down and out past the back pressure valve 11 and through the opening 10 and up around the set shoe pipe 8, and coupling 7 until it is stopped by the expanded container 6 and said plastic material will flow thence through the channels 53 in the wall of the coupling 7 and on up through the channels

54 leading upwardly through the intermediate tubular section 14 and will pass thence upwardly through the channel 55 around the upper section 15 of the conducting tube and thence outwardly through the ports 56 and through the channels 57, in the walls of the upper coupling 2 and out through the ports 58 into the sack 12 and said sack will be filled with cementitious material and expanded out against the surrounding walls of the bore.

The screw threaded connections between the parts hereinbefore referred to are right hand threaded connections except as otherwise specified.

The cement in the expanded sacks or containers 6 and 12 is then allowed to set and when it has set the plug 49 will be drilled out and a suitable fishing tool such as a tapering tap, is then lowered and engaged with the tubular nipple 36 and said nipple is backed up until the annular groove 41 registers with the annular groove 39 and thereupon the locking ring 40 will expand and lock said nipple with the coupling 33. When the nipple 36 is backed off the packing 30, 31 will be relaxed and as the nipple 36 is further turned the coupling 33, the pipe 34 and the coupling 28 will be turned with it, and said last mentioned coupling will be backed off or unscrewed from the upper end of the intermediate section 14 thus relaxing the packer sleeves 20, 19, 18 and at the same time, the upper section 15 will also be unscrewed from said intermediate section 14 and when the sections 15, 14 have been separated, said tubular section 15 and the pipe section 34 and the appendants thereof may be withdrawn from the well leaving the screen free and the well ready for production.

If it should be later desired to drill the well deeper, suitable tools may be introduced down through the string and intermediate section of the conducting tube 14 may be engaged and turned to the right and the left hand threads 16 backed off and the pipe 13 and the appendants thereon withdrawn and the set shoe may then be drilled out and the bore deepened.

If for any reason the cementitious material beneath the screen may have set so as to make it impossible to back off the pipe 13 a milling tool may be employed for the purpose of milling out the parts beneath the screen to permit deeper drilling.

The drawings and description disclose what is now considered to be a preferred form of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What is claimed is:

1. The combination with a tubular setting string and a screen attached thereto, of expansible containers one above and the other beneath the screen, a conducting tube through which cementitious material may be conducted down through the screen, packing about said tube above and beneath the screen, there being passageways leading from said tube into the lower container and into the well bore beneath said lower container and return channels leading from the bore beneath said lower container into the upper container.

2. The combination with a string of pipe and a screen attached thereto, of expansible containers therearound, one above and the other beneath the screen, a conducting tube leading downwardly through the screen, there being outlet channels leading outwardly from said tube some

terminating in the lower container and some terminating in the well bore beneath the lower container, there being return channels leading from the bore beneath said lower container into the upper container.

3. The combination with a string of pipe and a screen attached thereto, of expansible containers therearound, one above and the other beneath the screen, a conducting tube leading downwardly through the screen, there being outlet channels leading outwardly from said tube some terminating in the lower container and some terminating in the well bore beneath the lower container, there being return channels leading from the bore beneath said lower container into the upper container, and a valve in the tube normally closing said outlet channels.

4. The combination with a string of pipe and a screen attached thereto, of expansible containers therearound, one above and the other beneath the screen, a conducting tube leading downwardly through the screen, there being outlet channels leading outwardly from said tube some terminating in the lower container and some terminating in the well bore beneath the lower container, there being return channels leading from the bore beneath said lower container into the upper container, and packing about the tube above and below the screen.

5. The combination with a string of pipe and a screen attached thereto, of expansible containers therearound, one above and the other beneath the screen, a conducting tube leading downwardly through the screen, there being outlet channels leading outwardly from said tube some terminating in the lower container and some terminating in the well bore beneath the lower container, there being return channels leading from the bore beneath said lower container into the upper container, packing about said tube above and below the screen and a valve in the tube normally closing said outlet channels.

6. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above and beneath the screen for closing the space between said tube and string, there being channels leading from said tube through which plastic, cementitious, material may be delivered from the tube into the bore around the string above and beneath said screen.

7. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above and beneath the screen for closing the space between said tube and string, there being channels leading from said tube through which plastic, cementitious material may be delivered from the tube into the bore around the string above and beneath said screen and a valve normally closing said channels.

8. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above and beneath the screen for closing the space between said tube and string, there being a channel leading from the tube into the bore beneath the screen, and a channel leading from the bore beneath the screen and terminating in the bore above the screen and a valve in the tube for controlling the flow fluid from the tube into said channel.

9. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above

and beneath the screen for closing the space between said tube and string said string having passageways through which plastic, cementitious material may be delivered into the bore around the string above and below the screen.

10. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above and beneath the screen for closing the space between said tube and string, said string having passageways through which plastic, cementitious material may be delivered into the bore around the string above and below the screen, and means forming barriers to exclude said plastic material in the bore from reaching the screen.

11. The combination with a string of pipe having a screen incorporated therein, in a well bore, of a tube through the screen, packing means above and beneath the screen for closing the space between said tube and string, containers around the string, one above and the other beneath the screen, there being passageways for plastic, cementitious material through which said material may pass from said tube into said containers.

12. The combination with a string of pipe having a screen incorporated therein, an expansible container about the string beneath the screen, an expansible container about the string above the screen, a tube through the screen, means above and beneath the screen closing the space between the tube and screen, there being passageways one leading from the tube into the lower container, and one leading from the outside of the string beneath the lower container into the upper container.

13. The combination with a string of pipe having a screen incorporated therein, an expansible container about the string beneath the screen, an expansible container about the string above the screen, a tube through the screen, means above and beneath the screen closing the space between the tube and screen, there being passageways one leading from the tube into the lower container, and one leading from the outside of the string beneath the lower container into the upper container, and a valve in the tube normally closing said passageway into the lower container.

14. The combination with a string of pipe having a screen incorporated therein, an expansible container about the string beneath the screen, an expansible container about the string above the screen, a tube through the screen, means above and beneath the screen closing the space between the tube and screen, there being passageways one leading from the tube into the lower container, and one leading from the outside of the string beneath the lower container into the upper container, and a valve in the tube normally closing said passageway into the lower container there being a by-pass, normally closed by said valve and leading from said last mentioned passageway into the tube beneath said valve.

15. The combination with a string of pipe for use in a well bore and having a perforated section, of a tube through said section, there being channels leading from the tube through which a sealing material may be delivered from the tube into the bore around the string at spaced locations, and a valve normally closing said channels.

16. The combination with a string of pipe for use in a well bore and having a perforated section, of a tube through said section, there being channels leading from the tube through which a

sealing material may be delivered from the tube into the bore around the string at spaced locations, and a valve normally closing said channels said valve being adapted to be exposed to pressure above whereby the valve may be moved to open said channels.

17. The combination with a string of pipe having a screen incorporated therein and adapted for use in a well bore, of a tube through the screen, there being channels through which a sealing material may be conducted from the tube

and delivered into the bore around the string above and below the screen, a valve in the tube normally closing said channels, said valve being arranged to support an object dropped through said tube and through which the valve may be moved into position to open said channels by fluid pressure exerted through the tube against said object.

Mrs. S. E. MANNING,
Administratrix of the Estate of Sanford E. Manning, Deceased.

15		90
20		95
25		100
30		105
35		110
40		115
45		120
50		125
55		130
60		135
65		140
70		145
75		150