

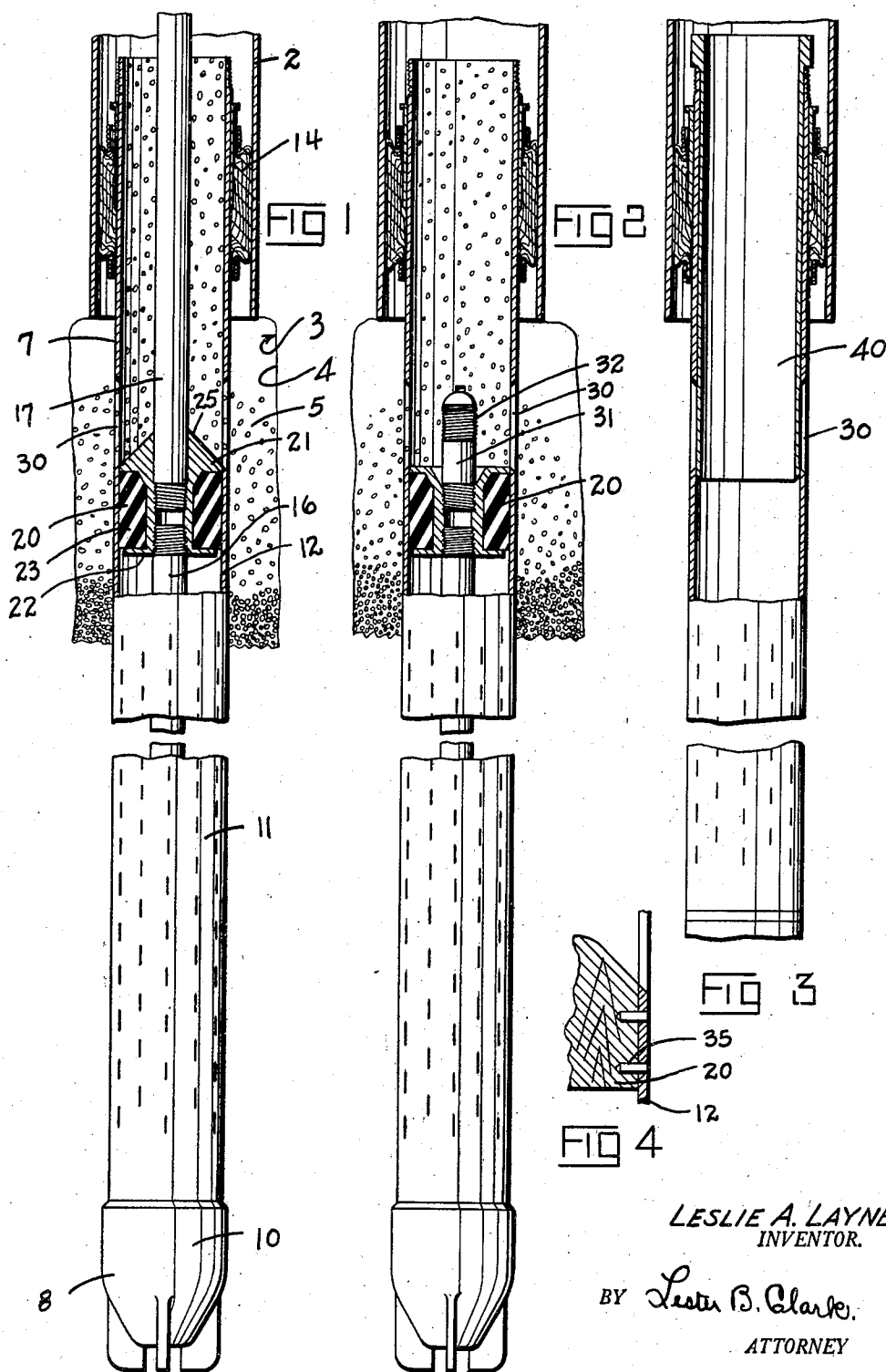
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WELL BOTTOM ASSEMBLY FOR GRAVELING

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WELL BOTTOM ASSEMBLY FOR GRAVELING

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2 Claims. (Cl. 166—1)

The invention relates to a well bottom assembly to be used in the graveling of wells after the well bottom has been landed on bottom in position.

In completing wells drilled by the rotary method the producing formation very often occurs in a fine sandy stratum and it is necessary to locate a strainer or screen below the casing so as to exclude the sand from the fluid being produced. In order to reduce the rate of flow at the face of the well bore and to filter out the foreign material from the fluid being produced it is also desirable to provide a filter pack about the strainer and to this end the well bore is very often enlarged so as to provide a chamber to receive the gravel or filtering material. The most efficient manner of introducing this gravel material is to deposit it about the well bottom or strainer assembly after the assembly has been landed and fixed in position.

The present invention concerns itself with a well bottom assembly of a particular design which can be landed, sealed in position, the gravel material introduced through the assembly into the chamber in the well bore and the assembly thereafter closed so as to trap the gravel or filtering material in place.

It is one of the objects of the invention to provide a well bottom assembly through which the gravel material may be discharged into the well bore.

Another object of the invention is to provide a plug device for well bottom assemblies so as to deflect a flow of gravel material.

Another object of the invention is to provide a removable plug for well bottom assemblies so as to close the assembly at an elevation at which gravel material is to be discharged therefrom.

Still another object of the invention is to provide a plug for well bottoms which may be inserted or removed by a string of pipe or wire line.

Still another object of the invention is to provide a closure device for a set of gravel discharge ports in a well liner.

A still further object of the invention is to provide a plug device for well bottom assemblies which is releasably connected to the assembly for removal after the graveling operation has been completed.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawing, wherein:

Fig. 1 is a side elevation of the well bottom assembly illustrating the casing and the upper end of the assembly in section.

Fig. 2 is a view similar to Fig. 1 but illustrating a modified form of the plug which can be inserted or removed with a wire line.

Fig. 3 is a vertical sectional view illustrating the closure member for the liner of the well bottom assembly.

Fig. 4 is a broken detailed sectional view of a releasable connection for the plug.

In Fig. 1 the well casing is illustrated generally at 2. Such casing is usually affixed in position in the well bore by a body of cement. The producing formation is illustrated at 3 and the well bore has been enlarged to a diameter indicated at 4 so as to provide a chamber 5 into which the well bottom assembly 7 is inserted. The lower end 8 of this assembly will usually be landed upon the bottom of the well bore so that the upper end of the assembly is spaced within the lower end of the casing 2.

The well bottom assembly includes the set shoe 10 to which is connected a suitable length of screen or strainer 11 which has here been illustrated as being in the form of slotted pipe, but such strainer may take other forms, such as wire wrapped screen. The upper end of the assembly is a section of blank pipe 12 generally designated as the liner because of the fact that it lines the inside of the lower end of the casing 2 for a suitable distance. This liner carries a packer 14 which is here shown as a collapsible type of fabric packer which is expanded by collapsing longitudinally so as to force the fabric into firm engagement with the inside periphery of the casing 2. This forms a seal to prevent the flow of fluid or the escape of pressure upwardly into the casing around the outside of the well bottom assembly and also holds the assembly firmly in position.

As seen in the drawing, this packer has been set by the setting string of pipe which has thereafter been removed leaving the liner in position sealed in the casing.

In some instances the well bottom assembly has been lowered into position and the granular material discharged downwardly between the liner and the casing into the chamber 5 and the packer thereafter set. As distinguished from this, the present device contemplates that the packer 14 will be set as shown in Fig. 1 prior to the introduction of the gravel. Fig. 1 shows the well bottom assembly as having a wash pipe 16 therein which usually extends downwardly into the set shoe 10 for the purpose of manipulating the back pressure valve and for discharging washing liquid at the bottom of the assembly.

Usually this wash pipe is connected to a pipe or tubing 17 so that it can be operated either for raising, lowering, or rotating movement to effect the washing of the well and the closing of the bottom of the assembly.

In the present invention, however, a plug or packing device 20 is shown as being connected between the wash pipe 16 and the upper pipe 17. This plug includes a frame 21 having a lower flange 22 which serves to confine the packing material 23.

The wash pipe 16 is of a pre-determined length such that the upper tapered end 25 of the plug will serve as a deflector for gravel material moving downwardly through the casing 2 and the upper end of the liner 12. This gravel material may be delivered in any desired manner so long as it will downwardly flow through the liner to the elevation of the discharge ports 30 which are provided in the liner 12.

The gravel material will in this manner discharge through the well bottom assembly into the chamber 5 so as to form a filter pack about the well bottom assembly in the bore.

Fig. 2 shows the invention as previously described except that the well plug 20 is shown as being closed by a nipple 31 having a connecting means 32 thereon by which the plug and wash pipe may be either inserted or removed relative to the well bottom assembly 7. In this manner the well bottom assembly can be set in position without the plug 20 in place and if it is desired to introduce gravel material the plug 20 can be positioned so as to deflect the gravel material and after the graveling operation is completed the plug may be removed by use of a suitable fishing or grappling tool.

Fig. 4 shows a form of the plug 20 wherein no wash pipe such as 16 is to be utilized and the plug 20 is shown as being pinned into the liner 12 by means of a plurality of shear pins 35. The plug will be fixed in position prior to lowering the well bottom assembly into the well and is intended to remain in place until the graveling is completed.

The production tubing such as the pipe 17 of

Fig. 1 can then be lowered into the well and the plug rapped sharply so as to shear the pins 35 and push the plug downwardly through the assembly to the bottom.

Any one of the forms of plug here illustrated may be used for deflecting the gravel, but after the graveling operation is completed it is desirable that the ports 30 be closed so as to trap the gravel in the chamber 5. Fig. 3 shows a closure device 40 which is in the form of a sleeve which can be lowered into the well in any desired manner after the plug combination 20 has been removed. This sleeve 40 is intended to fit downwardly into the upper end of the liner 12 and is of a length to telescope downwardly inside of the liner so that its lower end overlies the ports 30 and closes such ports.

With the setting of the foregoing structure the well will be completed except for the introduction of the tubing and this tubing may be introduced to the desired elevation to receive the flow of fluid through the strainer 11 but the liner will be sealed firmly in position and the gravel material trapped in place.

Broadly the invention contemplates a removable gravel deflector plug and a method of graveling well after the well bottom assembly has been landed.

What is claimed is:

1. A well bottom to be set in a well bore comprising a strainer, liner and packer assembly, gravel discharge ports through said liner, and a combination pipe and gravel plug device insertable and removable relative to said well bottom to deflect gravel moving down the liner through said ports.

2. A well bottom to be set in a well bore comprising a strainer, liner and packer assembly, gravel discharge ports through said liner, a combination pipe and gravel plug device insertable and removable relative to said well bottom to deflect gravel moving down the liner through said ports, and means on said device for connection of a setting member thereto.

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