Dec. 3, 1940. S. P. HART 2,223,936

DEVICE FOR DEPOSITING CHEMICALS

Filed Feb. 16, 1940

FIG. 1

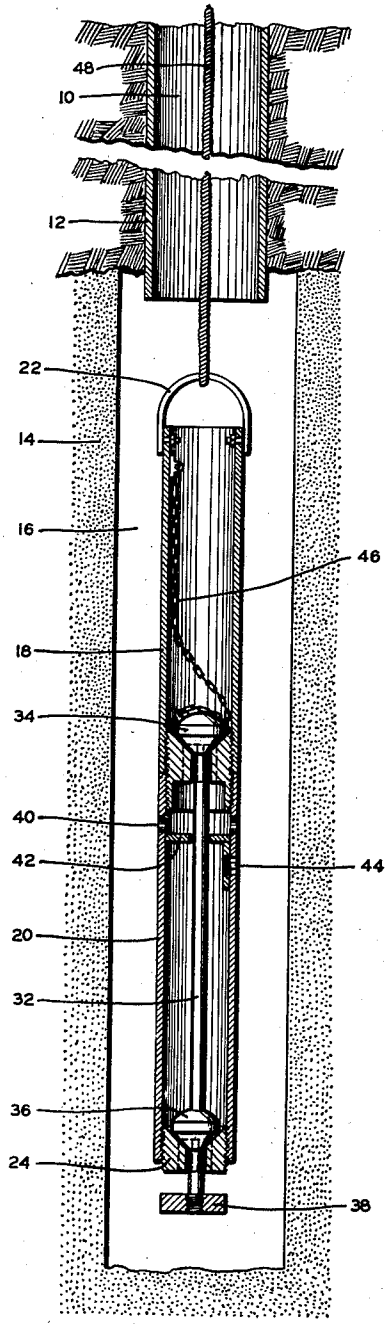


FIG. 2

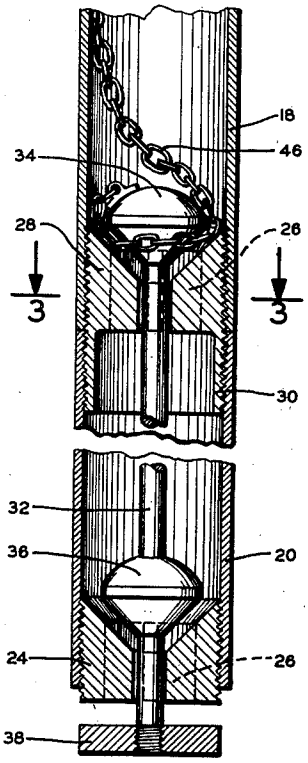
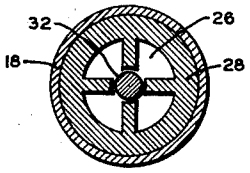


FIG. 3



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DEVICE FOR DEPOSITING CHEMICALS

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3 Claims. (Cl. 166—19)

This invention relates to devices for placing liquids such as chemicals in a well or bore hole and particularly to a device of this kind by means of which two chemicals can be maintained separate from each other while being lowered in the well and until they have been positioned at the bottom of the well whereupon they are released into the hole or well cavity.

The principal object of the invention is to provide a device which will effectively maintain two chemicals apart so as to prevent any reaction therebetween and which will release both chemicals so that they may mix at the predetermined time or location.

It is often desirable to shut off or to exclude water which would otherwise enter the bottom of a well and it has been found that certain chemicals when mixed together will gel so as to form a gelatinous or plastic mass which is capable of sealing the water producing formation to exclude the water. Since these chemicals tend to gel instantly upon mixing, it is obvious that they can not be mixed prior to being introduced into the well and various schemes have been suggested for lowering the liquids into the well while maintaining them separated until it is desired to release them. These methods have in general proved unsuccessful for various reasons. For instance, in accordance with one of these methods, the chemicals have been lowered into the well in a tube while being maintained separated by means of a diaphragm of a frangible material such as glass which diaphragm can be broken at the desired point to release the chemicals so that they will mix. It has been found that frequently the pressure in the hole is sufficient to cause these diaphragms to break, thus allowing the chemicals to mix prematurely and necessitating an expensive clean-out operation.

In accordance with this invention, a device in the nature of a bailer is provided, the device having separate chambers for holding the chemicals apart from each other and a double valve adapted to be opened when the device reaches the bottom of the well so as to release the two chemicals simultaneously so that they will flow out of the device and gel to seal off the bottom hole water.

For a better understanding of the invention, reference may be had to the accompanying drawing in which

Figure 1 is a vertical sectional view through a well showing the device in position to release the chemicals;

Figure 2 is an enlarged sectional elevation through a portion of the device showing the valves in their open position, and

Figure 3 is a section taken on the line 3—3 of Figure 2.

Referring to the drawing, a well 10 which may be provided with a suitable casing 12 extends into a formation 14 which may have been underreamed to provide a cavity 16.

The depositing device comprises a tubular structure which may be formed of a pair of pipe sections 18 and 20 secured end to end and the top section 18 being provided with a suitable bail 22. Threaded into the lower end of the section 20 is a valve seat 24 having a center opening and part of the remainder of which is cut out so as to form openings 26. Threaded into the lower end of the section 18 is another valve seat 28 similar to the seat 24 but having a depending sleeve 30 adapted to be threaded into the upper end of the section 20 to secure the sections together. A valve rod 32 is adapted to slide longitudinally through the two valve seats 24 and 28 and secured to this rod are a pair of valves 34 and 36 adapted to engage the valve seats 28 and 24 respectively so as to cover the openings 26. The lower sides of the valves and the upper sides of the seats are preferably cone-shaped so as to provide for tight contact when the valves are closed. Secured to the lower end of the rod 32 is a plunger or disc member 38 adapted to engage the bottom of the well when the device has been lowered to the desired extent.

The upper end of the container section 20 is provided with ports or openings 40 and directly below these ports is a sealing disc 42 rigidly secured to the inner surface of the section 20 and having a center opening through which the valve rod 32 is adapted to slide. A filler opening 44 adapted to be closed by means of a suitable plug is formed in the section 20 slightly below the disc 42. As it is preferred to maintain the valves open once they have been opened to release the chemicals, a chain 46 is secured at its upper end to the section 18 and at its lower end to the valve 34. The chain is of such a length that when the valves have been raised, as is shown in Figure 2, a portion of the chain will slip below the valve 34, that is between the valve and its seat 28, so as to maintain the valves in their upper or open position.

In operation, the device is assembled at the surface with the valves 34 and 36 in their closed position and a chemical such as a casein-borax

solution is placed in the lower section 20 through the opening 44 after which the plug is inserted to close the opening. The second chemical which may be a formaldehyde solution is then placed in the upper section 18 after which the device is lowered through the well by means of a suitable cable 48. When the device reaches the bottom of the hole the plunger 38 will engage the formation whereupon the rod 32 and the valves 34 and 36 will be raised to the position shown in Figure 2. The upper solution then passes downwardly through the valve seat 28 and outwardly through the ports 40 and simultaneously therewith the lower solution passes downwardly and out of the device through the openings 26 in the valve seat 24. The device is then pulled from the hole by means of the cable 48 and the chemical solutions mix to form a gel which effectively seals the formation against the ingress of water.

It is understood that the particular chemicals which have been mentioned do not form a part of the invention and, in fact, other solutions, for instance sodium silicate and an acid salt such as zinc chloride, may be used to form a gelatinous or plastic mass to seal the formation.

Although the device has been described for use in depositing chemicals to shut off bottom hole water, it may be used for other purposes and, in fact, whenever it is desired to place two chemicals in a well and to maintain them separated during the running in operation. Again, although the device as illustrated is adapted to place two chemicals in a well, other sections similar to the section 20 could be added below the section 20 with additional valves and valve seats so that three or more chemicals could be deposited simultaneously if such should be found desirable. A cover of any type could be placed over the upper section if it is desired to close this section while the device is being run into the well.

Obviously, many other modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated by the appended claims.

I claim:

1. A device for depositing two chemicals in a well simultaneously comprising a normally vertical tubular container provided with a pair of chambers and outlet ports adapted to be placed in communication with said chambers, a valve normally closing the outlet port from each of said chambers and means for opening said valves when the device is lowered into contact with the bottom of the well, to release the chemicals from the two chambers simultaneously.

2. A device for depositing two chemicals in a well simultaneously comprising a normally vertical tubular container provided with a pair of separate chambers for holding said chemicals in separated relation, outlet ports adapted to be connected with said chambers, valves associated with said ports and a plunger member connected to said valves and adapted when striking the bottom of said well, to open said valves to release the chemicals from said chambers.

3. A device for lowering and depositing two chemicals at the bottom of a well comprising a container having a pair of chambers disposed vertically end to end, a valve seat between said chambers, a second valve seat at the lower end of the lower chamber, ports leading from said first mentioned valve seat to the outside of said container, a valve rod extending slidably through said valve seats, a pair of valves on said rod adapted to engage and close said valve seats when said device is being lowered into the well, and a downwardly projecting extension on said valve rod adapted when contacting the bottom of the well to raise said valves from said seats so that said chemicals can flow out of said container simultaneously.

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