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APPARATUS FOR SEALING WELLS

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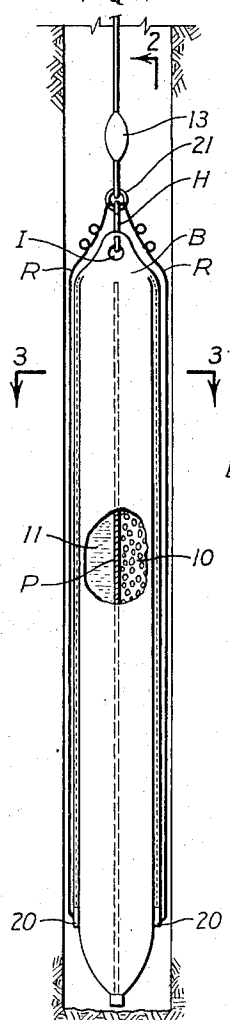
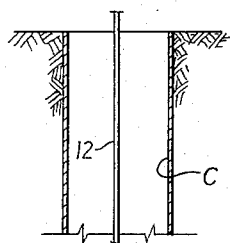


Fig. 1

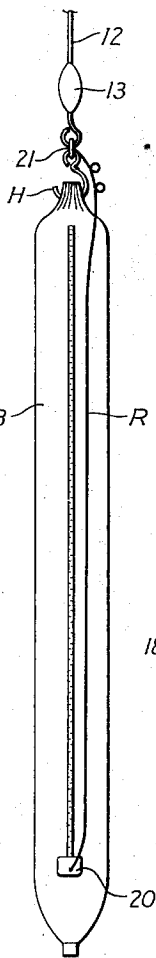


Fig. 2

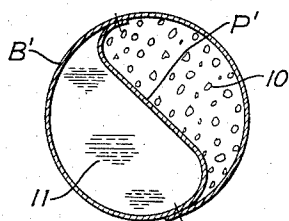


Fig. 3

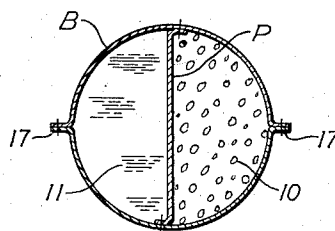


Fig. 4

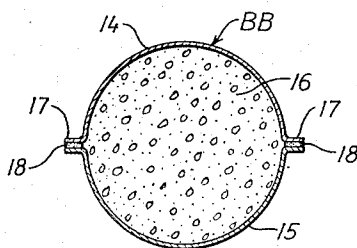


Fig. 5

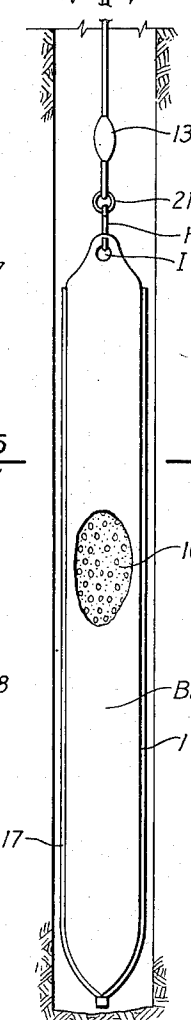
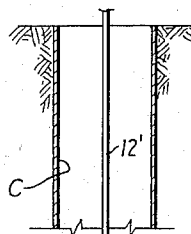


Fig. 6

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APPARATUS FOR SEALING WELLS

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3 Claims. (Cl. 166—13)

1

The present invention relates to apparatus for sealing wells.

In well drilling operations, an underground flow or structural fracture is frequently encountered or intersected which causes the loss of essential drilling mud, and it is an important object of this invention to prevent this loss of mud by providing apparatus by which flow or hole plugging or caking material is positioned in close proximity to the place to be sealed, prior to its being released to a wetting action, thereby causing its swelling and/or setting to occur at exactly the correct place where the sealing is required.

Another important object of the invention is to provide a container or cartridge for carrying the sealing material intact directly to the point of application in the shaft, where the contents of the container are released, after which the container is withdrawn from the well shaft.

A further object of the invention is to provide a container of this character which is opened in several different manners to discharge its contents.

A still further object of the invention is to provide a container having separate compartments for holding and conveying the exact proportions of the ingredients constituting the plugging material or mass, to the exact point of application.

Another object of the invention is to provide a container of the above character which can be easily withdrawn from the shaft after depositing its charge thereto.

Other objects and advantages will become apparent during the course of the following description.

In the accompanying drawing forming a part of the description and wherein like numerals and letters are employed to designate like parts throughout the several views:

Fig. 1 is a vertical section of a drilled well showing my invention positioned at the lower end of the same in position ready to discharge its sealing material.

Fig. 2 is a side elevation of my invention swung around at a right angle from the position shown in Fig. 1.

Fig. 3 is an enlarged transverse section of the container taken on the line 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a side elevation of a modified form of the invention.

Fig. 5 is a transverse section of the same taken on the line 5—5 of Fig. 4 looking in the direction of the arrows, and

2

Fig. 6 is a transverse section of a modified form of the partitioned container shown in Fig. 3.

In well drilling operations, an underground flow is frequently encountered, such as water or the like, which, unless plugged up to by-pass the well bore will cause the loss of the drilling mud. To offset this condition, it has been customary to insert in the hole, various sealing materials such as bentonite, quick setting cement, cotton seed hulls and the like which will swell when wetted with the moisture in the hole and set. Before the time, however, that the material reaches the place where its use is required, the swelling or expansion has been completed and it fails to reach the desired place or fails to function as intended. In order to take all of the chance and guesswork out of this important task, it is here proposed to convey the sealing material in a single charge or cartridge to the exact point of application before releasing it to the action of moisture, water or other liquid to cause the swelling and sealing action to take place only at the place where the underground flow is to be plugged.

This is very effectively and economically effected by providing a tubular container B, BB, or B' for the dry sealing material 10 in Figs. 1, 3 and 6, or 16 in Figs. 4 and 5, and which may be any of those mentioned above or others or combinations of the same. This container is preferably constructed from material which is completely waterproofed and this material may be a fabric or heavy paper such as that from which present cement bags are made, waterproofed either before or after being formed into a tubular cartridge or container of small enough diameter to clear and slide freely along the inside diameter of the well casing C and the drilled shaft, and elongated enough to contain a substantial and sufficient quantity of sealing material to accomplish its function. The container B or BB is formed with a conical thoroughly sealed bottom or lower end in which a weight may be deposited whenever the container and its charge of sealing material, by its own weight, will not readily penetrate material existing in the shaft. This extra weight may be provided by depositing a quantity of buckshot (not shown) in the bottom of the container before filling it with the sealing material. The container is provided with a pair of diametrically disposed seams 17 extending longitudinally thereof from points adjacent its bottom to a point adjacent the top of the container where the top is drawn closed and provided with openings or eyelets I. If desired these seams may

extend all of the way to the apex of the conical bottom so that when the container seams are opened all of the way down to completely discharge the contents, two strips 14 and 15 hang pendently from their upper ends from suspension means for easy withdrawal, as will be presently described.

In the case illustrated where the lower ends of the seams end a distance above the conical bottom, the container may be constructed from a single length of material folded in half transversely upon itself whereby each longitudinal edge of the material may be folded back upon itself to overlap as shown in Figs. 3 and 5 to form the two seams. In Figs. 1, 2 and 3 these overlapped edges are sewed together with a strong thread or cord R in a chain stitch or any other form of stitching which will pull out when a projecting end of the cord is pulled. Or a rip-cord or wire may be adhesively sealed or sewed in between the two overlapping edges 17 of each seam so that when a projecting end of the cord is pulled lengthwise of the seam, the latter will be opened to discharge the contents. With some well sealing materials, the container may be made without ripping or severable seams, and a hooked knife blade or wire 20 may extend through the fabric of the container near its lower end and be attached to a cord R extending longitudinally of the container to the top thereof so that when pulled upwardly the knife blade or wire will slit or cut the material of the container lengthwise. In the form shown in Figs. 1, 2, 3 and 6 the container is provided with a longitudinally extending partition P or P' to divide it into two separate compartments completely sealed off from each other, the compartment 10 being for the dry, moisture swelling ingredient of the sealing material and the compartment 11 being for the liquid or water 11. This partition can be a separate piece as shown in Fig. 3, or may be integral with the material or fabric forming the container as shown in Fig. 6 wherein a single piece of material has one longitudinal edge portion and an intermediate portion formed into a tube B' of circular cross-section and its other longitudinal edge portion turned inwardly of the section and extended substantially diametrically thereof to form a partition P' until its longitudinal edge is turned to lap against the circular section, where it is secured by chain stitching, soluble adhesives or otherwise, and with one end of the cord R extended as shown in Fig. 2. The other or outer longitudinal edge of the material is likewise secured to the circular section as shown. The upper and lower ends of this tube may be gathered in and closed with appropriate sealing of the contents therein.

As previously stated, the top of the container of whatever form, is provided with eyelets or openings I so that they align when the top is gathered in, for a hook H having a wide open bight or mouth to be threaded therethrough for suspension of the container from a drop-line or cable 12 attached to the hook for lowering the container in the drilled shaft. A link 21 connects the cable to the hook so as to provide for loose linkage between these elements and a predetermined forward tilting of the hook H when the container has been lowered by the cable to the desired point of application of the sealing material, and the cable is slackened, assisted by a weight 13 on the cable, causing the upper end of the hook to tilt on the axis of the hook toward the left of Fig. 2 thereby dropping out of the eye-

lets or openings I of the container. The upper ends of the rip-cords R of the seams are connected with a slight amount of slack to the loop 21 of the lowering and hoisting cable 12, so that when the hook H has been disengaged from the container all of the weight of the latter will be imposed upon the rip-cords. Consequently when the cable 12 is then elevated or pulled up through the well shaft, the rip-cords R will be pulled out of the seams to open them and cause the contents of the container to become discharged into the shaft, as the hoist cable continues its upward movement to retrieve the container from the hole. Should the container or any part thereof tear away from the cable and remain in the shaft, no serious difficulty will be encountered, as it will be readily drilled through in subsequent drilling operations.

It may be desirable to provide a hook H which is of sufficient strength to sustain the weight of the container B, BB, or B' while being lowered in the shaft but which, when yanked up sharply, will bend and thus pull out of the eyelet or eyelets I.

In the form of invention illustrated in Figs. 4 and 5 the tubular container BB is shown without a partition for containing a sealing charge of bentonite or the like 16 to be wetted by the moisture of liquid in the drilled shaft. This container is preferably formed from two elongated strips 14 and 15 of heavy, tough water-proofed paper with their longitudinal edges 17 lapped and joined together with any suitable water-soluble adhesive 18 of sufficient strength to hold the seams and contents as long as the container remains in a substantially dry condition. When, however, the container is lowered, by the lowering and hoisting cable 12' having weight 13' and hook H, to reach the desired point of discharge and becomes wetted, the soaking of the seams will dissolve the adhesive, causing the strips 14 and 15 to separate, thus releasing the contents. With this form of the invention, it is unnecessary to use the unhooking feature of the hook H as no rip-cords are employed, but if it is not desired to retrieve the container, the hook H may be dropped out of the openings or eyelets I as hereinbefore explained, and lifted by the cable 12' from the shaft.

The invention comprehends container discharge means other than those here previously disclosed, such as an impact or electrically operated detonator cap and a small charge of powder in the lower end of the container, so that when fired, the bottom only of the container will be ruptured to permit emptying of the sealing material carried in the upper portion of the container, as the latter is lifted from the shaft by a cable 12'. It will be understood that various other changes in the size, shape and arrangement of parts may be resorted to without departing from the scope outlined for the invention.

Having thus described the invention, what is claimed is:

1. Means used for sealing wells, comprising a container adapted to contain a sealing material and having a rip-cord seam extending longitudinally of the container, suspension means detachably connected to said container for lowering it and being connected with the rip-cord seam whereby when said suspension means is detached from said container and elevated it rips said cord from said longitudinally extend-

5

ing seam to open the same for discharging said contents.

2. Means used for sealing wells comprising a container adapted to contain sealing material and having a seam closed by a rip-cord or thread extending from the bottom of said container up one side thereof, suspension means detachably connected to the top of said container for lowering the same and having connection with said rip-cord to remove the same from said seam when said suspension means is detached from said container and elevated to move said rip-cord vertically relative to said container.

3. Means used for sealing wells comprising a container adapted to contain sealing material, said container having its top provided with an eyelet opening, a suspension hook having a relatively wide open bight threaded through said eyelet opening, a suspension cable suspending said hook and having a weight, said container having a frangible seam extending from the bottom of said container to a point adjacent its top, and seam opening means extending into said

6

seam at its bottom and attached to said suspension cable and adapted to ride upwardly of said seam to open same after said suspension cable is slacked off to disengage said hook from said eyelet opening and said cable is elevated to raise said opening means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
454,082	Stephenson	June 16, 1891
1,190,024	Sitzman	July 4, 1916
1,393,311	Pendleton	Oct. 11, 1921
1,562,123	Pitts	Nov. 17, 1925
1,807,819	Altgelt	June 2, 1931
1,912,578	Halliburton	June 6, 1933
1,934,701	Edwards et al.	Nov. 14, 1933
2,352,805	Scheuermann et al.	July 4, 1944
2,373,006	Baker	Apr. 3, 1945