March 11, 1930. B. R. STEPHENSON 1,749,928

SOUNDING APPARATUS

Filed Oct. 7, 1927

FIG. 1

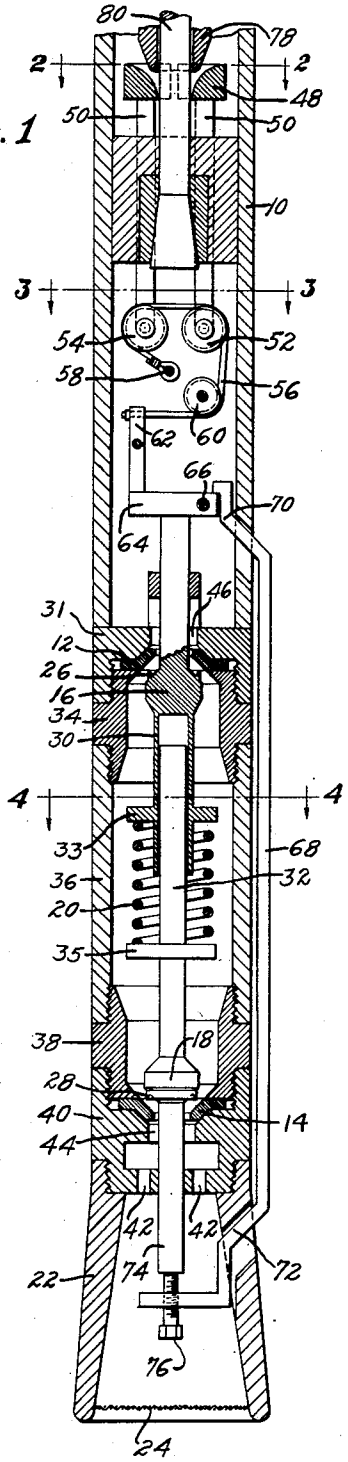



FIG. 2

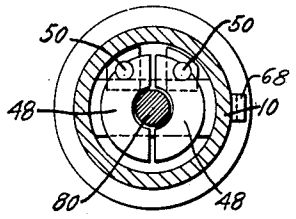



FIG. 3

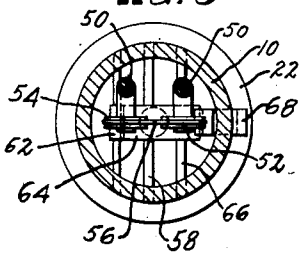
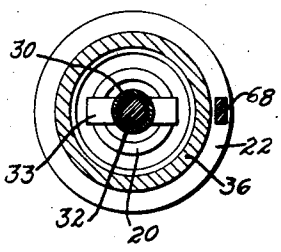



FIG. 4




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Patented Mar. 11, 1930 1,749,928

# UNITED STATES PATENT OFFICE

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## SOUNDING APPARATUS

Application filed October 7, 1927. Serial No. 224,741.

This invention relates to sounding apparatus and is herein illustrated as embodied in a device for use in obtaining specimens of substances located at various depths in gas or oil wells.

It frequently becomes desirable, in the drilling or operation of a well, such, for example, as an oil or gas well, to draw up specimens of the substances that are present within the well in order that these substances may be examined and analyzed to determine exactly their constituent parts, which is to say, whether they are composed of oil, water, or gas, or a mixture of these. Furthermore, it is often advantageous to obtain specimens from different depths within the well, and accordingly, in order to accomplish this desirable result, the sounding device should preferably be so constructed that it may be lowered to a desired depth within a well and there manipulated to entrap a specimen of the substances existing at that depth.

With the foregoing considerations in view, the present invention has for an object thereof the provision of an improved sounding device arranged for quick and facile manipulation at any depth within a well, and designed to prevent possible escape through leakage of specimens that are obtained during the operation of the device.

A feature of the invention which aims toward the accomplishment of the above recited object consists in the provision of a sounding device which may be lowered into a well to a desired depth and thereupon manipulated from a point located above the well to obtain a specimen of the substances located within the well at the point to which the device has been lowered. In the illustrated embodiment of the invention the sounding device is secured to the lower extremity of a hollow shaft and is provided with valves which normally remain in an open position, but which may be closed at any time by means of mechanism located within the hollow shaft.

Inasmuch as the locality at which it may be desired to obtain specimens may be disposed above or below the liquid level of the well, it is to be appreciated that a device of the character under discussion should be equally capable of procuring and retaining fluid specimens located beneath the fluid level, as well as gaseous specimens located above the fluid level. Accordingly another object of the invention consists in constructing a sounding device in such a manner that it may be operated with equal ease and facility in either a gaseous or a liquid medium. Another feature of the invention, therefore, consists in equipping the sounding device with valves which may be seated with such accuracy and precision as to prevent escape from the sounding device of any substances, no matter what their nature, which may be entrapped therein.

In the illustrated embodiment of the invention, the valves are formed with knife edges and the valve seats are formed of a ductile substance, such, for example, as aluminum, to insure the knife edges seating properly when they occupy their closed positions.

Other features and objects of the invention will become apparent from a reading of the following specification in the light of the accompanying drawings, in which,

Fig. 1 is an elevation view in section of a sounding device embodying the invention,

Fig. 2 is a plan view taken in section along the line 2—2 of Fig. 1,

Fig. 3 is a view similar to Fig. 2 taken along the line 3—3 of Fig. 1, and

Fig. 4 is a view also similar to Fig. 2, but taken along the line 4—4 of Fig. 1.

As shown in the drawings, the reference numeral 10 indicates a hollow shaft, or lowering rod, to the lower end of which there is rigidly secured a sounding device which, for the sake of convenience, will hereinafter be referred to as a sounding bottle.

Generally speaking, the sounding bottle comprises a tubular body member having valve seats 12 and 14 located at the upper and lower extremities thereof. Valves 16 and 18 are arranged to cooperate respectively with the valve seats 12 and 14, and a compression spring 20 tends normally to maintain the valves in a closed position. A funnel-shaped entering spout 22 is attached to the lower end of the bottle and is provided with a screen covering 24 for preventing the entry into the bottle of sediment and other foreign matter.

The valve seats 12 and 14 are made of a ductile material, such, for example, as aluminum, and the valves 16 and 18 are provided with knife edges 26 and 28 to cut into with the valve seats thereby sealing up the interior of the bottle when the valves occupy a closed position.

As illustrated, the valve 16 is provided with a hollow valve stem 30 which is arranged in telescopic engagement with a valve stem 32 formed integrally with the valve 18. Collars or shoulders 33, 35 are formed on the stems 30 and 32 respectively to provide abutments for the opposite ends of the compression spring 20.

To facilitate and expedite the disassemblage, the body of the sounding bottle is composed of a plurality of sections having screw-threaded engagement with one another. These sections, as shown in Fig. 1, comprise a cap 31 and a coupling 34 between which there is positioned the valve seat 12; a tubular member 36; and a lower coupling 38 and a cap 40 between which there is located the lower valve seat 14. By virtue of positioning each valve seat between a cap and coupling, the valve seat is held firmly in position and serves as a gasket to seat the joint between the cap and the coupling. Ports 42 and 44 serve to permit entry of liquid and gaseous substances into the interior of the sounding bottle and ports 46 permit escape of the substances from the sounding device as it is being lowered into a well.

From so much of the description as has already been given, it is apparent that as the device is lowered into a well the gaseous or liquid substances located in the well pass through the spout 22 and into the interior of the sounding bottle through the ports 42 and 44 and escape through the upper ports 46 into the hollow shaft or lowering rod 10, which may conveniently be provided with openings through which final escape of the substances passing through the sounding bottle may be effected. Owing to the fact that the passage of the substances through the sounding bottle continues as the latter is lowered into a well, it will be appreciated that the substances present within the bottle are at all times typical of the substances surrounding the device, and hence if the valves are closed there will be entrapped within the bottle a specimen of the exact substances surrounding the sealed sounding bottle.

As hereinbefore pointed out, the compression spring 20 tends normally to maintain the valves 16 and 18 in a closed position, and the following paragraphs will be devoted to a description of mechanism which is provided for holding the valves open during the lowering of the device into a well but operable to close the valves instantaneously, as desired.

A split collar 48 has each of its parts provided with one of a plurality of depending rods 50, the lower ends of which are arranged to support rotary wheels 52 and 54. A securing device 56 herein illustrated in the form of a cord has one of its ends fixedly secured to a pin 58 extending from the shaft 10 and is arranged to pass over the wheels 52 and 54 and thence over an additional wheel 60, after which it is secured to the upper arm of a pivoted lever 62. The lower end of the lever is arranged to be disposed immediately above the outer extremity of a valve-controlled lever 64 which is pivoted at 66 to the hollow shaft 10. A rod 68 extends lengthwise of the sounding bottle outwardly thereof and has its upper portion 70 bent to extend through an opening in the shaft 10 and to overhang the end of the lever 64 opposite to that located beneath the lever 62. The lower end of the rod 68 is likewise bent at 72 to enter an opening formed in the conical spout 22 and to project beneath the lower end of an extension 74 formed on the lower valve 18. An adjusting screw 76 is located in the bent extremity 72 of the arm 68 for engagement with the depending extension of the valve 18.

In the operation of the device a messenger, indicated by the reference numeral 78 in Fig. 1, is allowed to slide down a cable 80 when the sounding device has been lowered to a desired depth within a well, and upon striking against the split collar 48, forces the rods 50 and the wheels 52 and 54 apart, thereby pulling the securing cord in such a manner as to pivot the lever 62 about its axis. Upon the lower extremity of the lever 62 moving out of engagement with the pivoted lever 64, the latter is swung about its axis of pivot 66 by means of the compression spring 20, thereby permitting the rod 68 to drop downwardly to such an extent that the valve 18 is free to move into a closed position. Thus it will be seen that both of the valves 16 and 18 may be moved into firm engagement with the valve seats 12 and 14 merely by the act of releasing the messenger 78, and are held in their seated positions by means of the compression spring 20.

It is to be observed that the valves and the valve-operating mechanism are set in their open positions as the device is lowered into a well, and thereafter they are closed by means of the messenger to entrap within the device specimens of the substances located within the well. By virtue of securing the cap 31 to the hollow shaft 10 in such a manner that it may be removed therefrom, it will be seen that upon removal of the device from a well a sealed sounding bottle may be removed from the shaft 10, the valve-operating mechanism reset, and an empty bottle secured to the shaft in place of the one removed.

Owing to the fact that the entering spout 22 is arranged in the shape of a funnel and

is provided with the screen 24, it may be inserted within a well until the bottom of the spout comes in contact with the bottom of the well and then hoisted to obtain specimens of the dirt or sand, etc., existing at the bottom of the well.

While the invention has been described herein with particular reference to a sounding device for use in connection with gas and oil wells, it is to be appreciated that the invention contemplates employment in analogous organizations and use in other similar fields.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

A sounding apparatus comprising, in combination, a container, oppositely disposed openings formed within the container, valves for closing the oppositely disposed openings, the stems of the valves being arranged in telescopic relation with each other, resilient means tending normally to close the valves, and means for maintaining the valves in an open position, the latter named means being operative from a point remote from the container to permit closing of the valves.

In testimony that I claim the foregoing I hereunto affix my signature.

BIRD R. STEPHENSON