Sept. 16, 1930. P. HAERTL 1,775,641

SAMPLING DEVICE AND THE LIKE

Filed Sept. 22, 1927

Fig. 1.

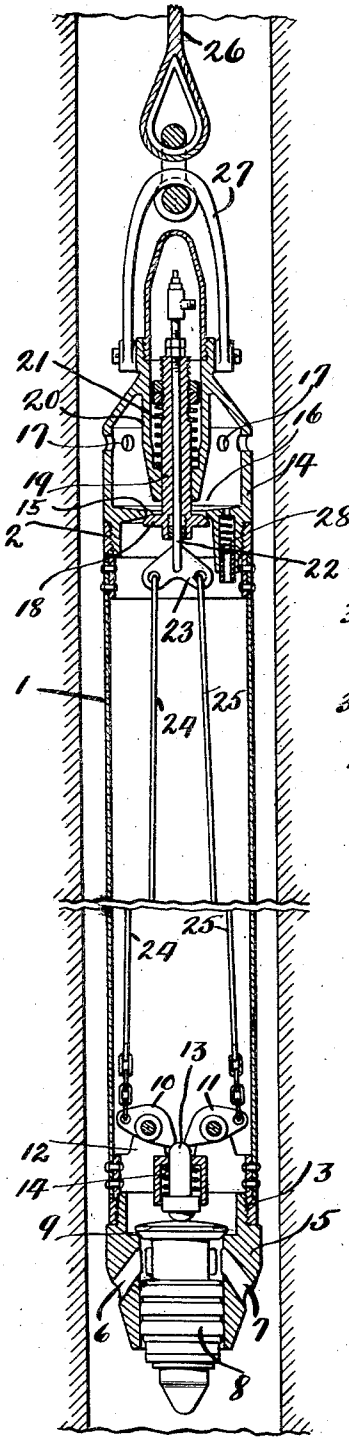


Fig. 2.

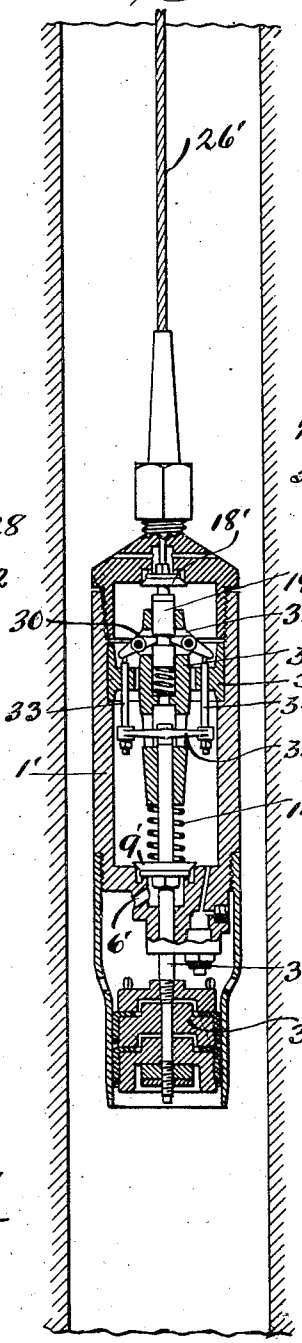
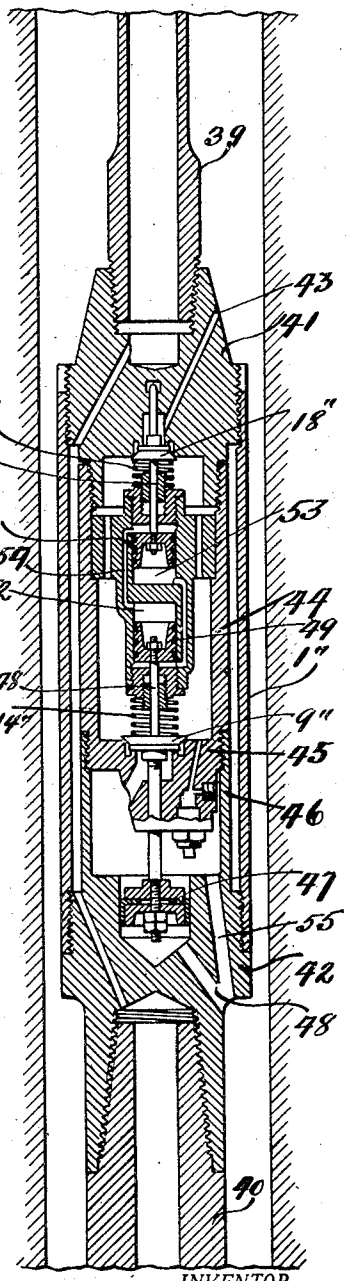


Fig. 3.



INVENTOR.
Paul Haertl.
BY Kidde and Margeson.
ATTORNEYS.

Patented Sept. 16, 1930 1,775,641

UNITED STATES PATENT OFFICE

PAUL HAERTL, OF BAD KISSINGEN, GERMANY

SAMPLING DEVICE AND THE LIKE

Application filed September 22, 1927, Serial No. 221,376, and in Germany September 25, 1926.

The present invention relates to an improvement in devices for drawing or sampling fluids, gases, etc., and has for one of its objects the provision of a device for this purpose provided with top and bottom valve mechanism or its equivalent, kept open during the descent of the device, this valve mechanism closing automatically after the device has reached the desired depth.

A further object of the invention is the provision of means such as above referred to in which the operating rope, cable, or other means by which the device is lowered and raised is not relied upon for effecting closure of the valve mechanism, thereby insuring a more certain and efficient operation, as well as adapting the device to more uses.

A further object of my invention is the provision of a device of the character above referred to, in which owing to its construction there will be no losses due to the pressure of the gases while the device is being hoisted to the surface, thereby obviating the likelihood of raising the device only partially filled.

A still further object of the invention is the provision of a device of the character indicated in which the closing of the valve mechanism occurs during the period of rest at the desired depth or immediately after attaining such depth and the filling of the vessel.

In the accompanying drawings,

Fig. 1 represents in sectional elevation an embodiment of my invention suitable for the drawing of crude oils, etc., from wells especially during the initial period of production when the presence of sand is likely to make pumping impossible;

Fig. 2 is another embodiment of my invention in sectional elevation, showing a device particularly suited to obtaining specimens from wells containing gas charged mineral water, petroleum, etc., for scientific investigation where such samples involve high internal pressure; and

Fig. 3 shows a further embodiment of my invention especially adapted for the taking of samples while drilling, the device being so arranged that samples may be taken after each stroke of the drill.

Referring to the drawings in detail and first of all to the embodiment of my invention illustrated on Fig. 1, the body or barrel of the device is designated 1, screw threaded at each end as indicated at 2 and 3, for the reception and retention of upper head 4 and lower head 5. The lower head 5 is provided with ports 6 and 7 and centrally with a piston 8 carrying a valve 9 adapted to seat in the head 5.

Double arm levers 10 and 11 are pivotally mounted on a member 12 within the barrel 1, one end of each of these levers engaging the upper end of a plunger 13, spring-pressed by spring 14 into engagement with the upper face of the valve 9.

The upper head 4 is provided with a port 15 adapted to communicate with a chamber 16, provided in the head, this chamber being provided in its side walls with vent ports 17 opening to the atmosphere. The port 15 is controlled by valve 18 carried on stem 19, this stem passing through an internal projection 20 formed in the head 4, a spring 21 being provided between the projection 20 and the upper end of the stem. This spring is adjustable.

Extending through the valve stem 19 is an adjustable spindle 22 carrying a plate 23 at its lower end, this plate having flexible connecting members 24 and 25 attached thereto, the member 24 being attached to the outer end of the lever 10, while the member 25 is attached to the outer end of the lever 11.

The springs 14 and 21 are set initially so that when the device is lowered, the valve 9 will lift off its seat owing to the resistance of the material through which the device is passing, while at the same time the valve 18 will be opened against the action of its spring 21, owing to the connection of the double armed levers 10 and 11 with the plate 23. Upon the interruption of the descent the bottom valve 9 is automatically closed, due to its own weight and the action of the spring 14, and likewise at the same time, but independently of the valve 9, the valve 18 is closed by its spring.

The device is raised and lowered by cable or rope 26 attached to a pivoted stirrup or the like, 27, attached to the head 4.

The chamber 16 above referred to is provided in its bottom with valve-controlled ports 28 for the purpose of preventing damage to the device when raised, due to internal pressures in the apparatus due to the contained material. In other words, the ports 28 act in the nature of safety devices.

In the modification illustrated in Fig. 2, 1′ designates the barrel of the device, 9′ a bottom valve, and 18′ a top valve. These two valves open in opposite directions as in the case of the Fig. 1. The stem 19′ of the valve 18′ has two doubled armed levers 30 and 31 operatively attached thereto, being pivoted to a member 32 in which the valve stem is slidable. Attached to the outer ends of the levers 30 and 31 are bars or rods 33 and 34, connected to each other at their lower ends by crosshead 35. These bars pass downwardly through a head or plug 36 set into the barrel 1′. The member 32 extends some distance below the bottom of the member 36 and the crosshead 35 extends through it transversely. Between the lower end of the member 32 and the upper face of the valve 9′ is a spring 14′. The lower side of the valve 9′ is provided with a stem 37 to which is attached a piston 38.

In operation this device may be lowered into the well or other region being explored by rope 26′, the pressure of the liquid or other medium causing the valve 9′ to open so as to admit the fluid through ports 6′ into the body of the barrel 1′. At the same time the upward movement of the valve 9′ will cause the upper valve 18′ to be pulled off its seat through the rods 33 and double armed levers 30 and 31. Upon cessation of the descent the valve 9′ will close by its own weight and the valve 18′ by reason of its spring 21′.

In the embodiment of my invention illustrated in Fig. 3, I have shown my apparatus as capable of being employed or operated between the drill bar 39 and a drill 40, in order that specimens or samples may be taken at each stroke, if desired, of the drill, thereby eliminating the necessity of stopping the drilling operation for any appreciable length of time.

In this form of my invention, 1″ designates the barrel of the apparatus corresponding to the barrels of Figs. 1 and 2. The upper end of this barrel is provided with a plug, threaded therein and designated 41, this plug receiving the lower end of the drill bar or drill rod 39. The lower end of the barrel 1″ is provided with a head or plug 42, screwed thereinto and adapted to receive the upper end of the drill 40.

In the lower face of the head 41 is provided a valve 18″ and controlling a port 43 in the head. The lower end of this head 41 is provided with a sleeve 44, threaded thereon; the lower end of this sleeve being closed by a head 45; this head or the lower end of the sleeve being screwed into an upward extension 46 on the head 42. In the head or bottom 45 of the sleeve 44 is provided a valve 9″, this valve opening upwardly and therefore in the opposite direction to the opening of the upper valve 18″. The lower side of the valve 9″ is provided with a piston 47, and this piston is acted upon in the drilling operation by the medium being drilled or through which the device is passing in the drilling operation, passing up through a port 48 provided in the member 42 for that purpose.

On the upper side of the valve 9″ is a coil spring 14″ corresponding to the spring 14′ of the embodiment of Fig. 2. Attached to the upper side of the lower valve 9″ is a spindle 48, carrying at its upper end a piston 49. On the under side of the valve 18″ is a piston 50, attached to the valve by stem or spindle 51. The piston 49 is in effect in a chamber 52, while the piston 50 is in effect in a chamber 53, communication between these two chambers being established by a port or passageway 54. It will be noticed that this port or passageway 54 is so arranged that any fluid in the chambers 52 and 53 will pass from the upper face of the piston 49 to the upper face of the piston 50.

When this device is in operation, it will be apparent that as the same descends, the fluid of which a sample or specimen is to be taken will pass into the space beneath the piston 47 attached to the valve 9″, causing this valve to lift off its seat. This unseating of the valve 9″ will cause the piston 49 to move upwardly, thereby through the medium of the fluid in the chambers 52 and 53 causing the piston 50 to move downwardly; this downward movement of the piston 50 throwing the valve 18″ off its seat.

With the valves 9″ and 18″ unseated, the medium through which the device is passing can flow through the port 55 in the head 41, through the port 55, communicating with the upper part of the device and upwardly past the valve 18″ and out through the port 43 in the upper head 41. When the device comes to rest, the weight of the valve 9″ and its piston 47 will cause the valve to seat, while the upper valve 18″ will seat itself under the action of its spring 21″. The device may then be withdrawn and the sample removed.

In all of the foregoing devices, it will be seen that I have provided means for taking samples from oil wells, mineral wells, and the like, in which I provide two valves, the lower valve in each case being caused to open automatically as the device is lowered, this automatic opening of the lower valve in each instance causing the upper valve to open, all this without reference to the rope or cable or other suspension means by which the device is suspended and by which it is raised and lowered. In other words, the entire operation of my improved device in the several embodiments shown and described is automatic. It

is obvious also that I have provided an apparatus of the character just indicated, in which upon the interruption of the descent of the device, the lower valve will close automatically, that is to say, due to its own weight and the action of its spring, while the upper valve will close automatically and independently of the closing of the lower valve, this upper valve being closed solely by the action of its spring. In other words, when the device is descending, the lower valve is opened, this opening of the lower valve causing the upper valve to open, while, when the descent of the device is interrupted, the two valves will close independently of each other.

By the arrangements and constructions herein illustrated and described, it will be apparent that in taking samples of any material, I am able, irrespective of the class of material of which samples are being taken, to maintain the device full, as distinguished from prior devices for this purpose in which the vessel is often only partly full, due to leakage, and this operation is true even where materials are being sampled or tested, containing gases under pressure.

What I claim is:

1. In a device of the class described, the combination of a vessel, a head at each end thereof, a port in each head, a valve for each of said ports, an operative connection between said valves whereby the opening of one valve effects the opening of the other valve, said valves closing independently of each other.

2. In a device of the class described, the combination of a vessel, a head at each end thereof, a port in each head, a valve for controlling each port, a flexible connection between said valves, said flexible connection being constructed so that one of said valves is opened by the opening of the other of said valves, said valves closing automatically and independently of each other.

3. In a device of the class described, the combination of a vessel, a head at each end thereof providing a chamber for receiving a fluid, a valve in the lower head, a valve in the upper head, a plunger operatively connected to the lower valve, and a connection between the lower valve and the upper valve, controlled by said plunger, the operation of said plunger due to the raising of the lower valve from its seat effecting movement of the upper valve from its seat, said lower valve closing by its own weight, and said upper valve being closed by a spring, the operation of which is independent of the closing of the lower valve.

4. In a device of the class described the combination of a vessel, a head at each end of said vessel, a port in each of said heads, a valve for each port, said valves opening in opposite directions, double armed levers connected to the stem of the upper of said valves, and a mechanical connection between the lower of said valves and said double armed levers effecting opening of the upper valve by the opening of the lower valve, said valves closing independently of each other.

5. In a device of the class described the combination of a main or body portion, a head at the lower end of said body portion and formed integral therewith, a head at the upper end of said body portion screwed therein, a valve in the lower head controlling a port therein, a valve in the upper head controlling a port in said upper head, said valves opening toward each other, a stem for the lower valve, a piston carried by said stem to effect automatic closure of said lower valve, a stem for the upper valve, pivoted levers operatively connected to said last mentioned stem, and a mechanical connection between the lower valve and the upper valve whereby opening of the lower valve as the device is lowered into a well or the like will effect an opening of the upper valve.

This specification signed this 25th day of August, 1927.

PAUL HAERTL.