July 13, 1937. E. H. COX 2,086,935

TESTING DEVICE

Filed Aug. 27, 1936

Fig. 1.

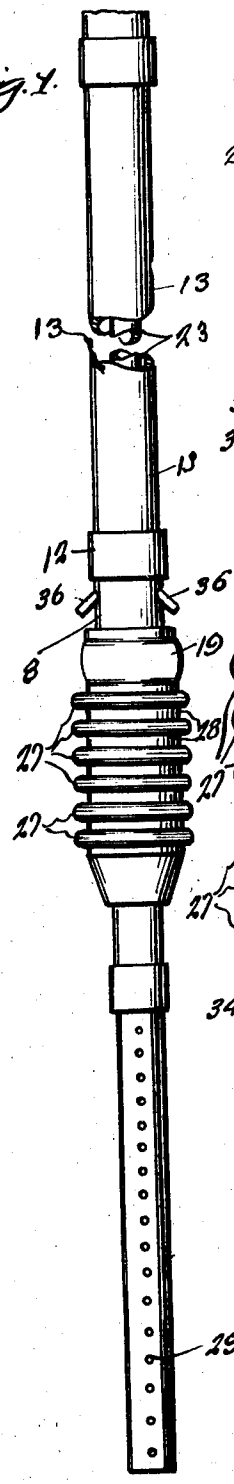


Fig. 2.

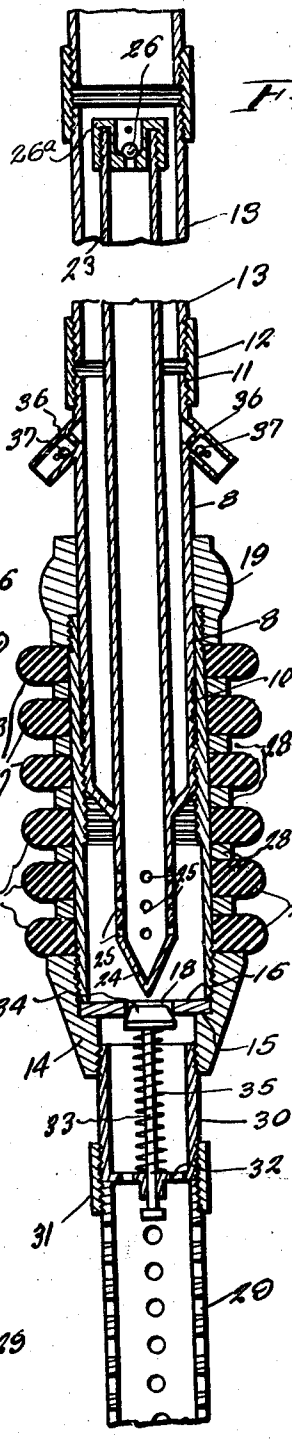


Fig. 3.

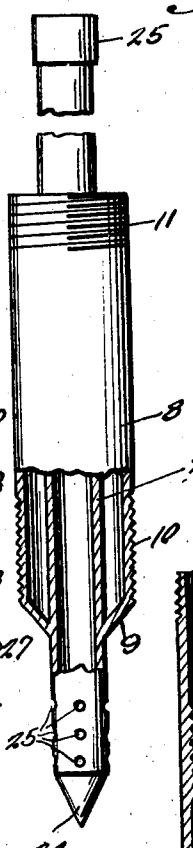
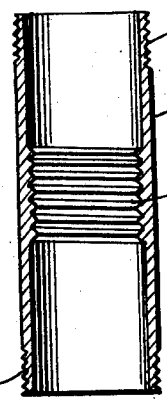


Fig. 5.



Fig. 4.



Inventor

Ernest H. Cox

By Clarence A. O'Brien

Hyman Berman

Attorneys

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UNITED STATES PATENT OFFICE

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TESTING DEVICE

Ernest H. Cox, Leedey, Okla.

Application August 27, 1936, Serial No. 98,242

5 Claims. (Cl. 166—1)

This invention is a device particularly designed for testing oil and gas wells and the object of the invention is to provide a device of this character which may be attached to the lower end of the rotary drill stem and which is so constructed and provided as to trap and catch an uncontaminated unadulterated sample of sand or fluid encountered or penetrated by the rotary drill bit.

The present invention involves certain new and useful improvements over that testing device forming the subject of my copending patent application Serial No. 66,482, filed February 29, 1936, and entitled "Testing device".

The present invention, together with its objects and advantages will be best understood from a study of the following description taken in connection with the accompanying drawing wherein:—

Figure 1 is an elevational view illustrating the application of the invention.

Figure 2 is a longitudinal sectional view therethrough.

Figure 3 is an elevational view of the sample holder with parts broken away and shown in section.

Figure 4 is a longitudinal view through a sleeve forming part of the invention and

Figure 5 is a perspective view of a valve seat.

Referring to the drawing in detail it will be seen that in the preferred embodiment the testing device comprises a sleeve 5 provided intermediate its ends with internal threads 6, and at its upper end with external threads 7, and external threads 7a at its lower end.

Further the device comprises a holder for samples of sand or the like and said holder consists of a barrel 8 tapered at one end as at 9 and adjacent said tapered end provided with threads 10 complemental to the threads 6 whereby the barrel 8 is adjustably engaged with the sleeve 5.

At its upper end the barrel 8 is externally threaded as at 11 so that through the medium of a coupling sleeve 12 said barrel is detachably connected with one end of the sections 13 of the well drill string.

Threaded on the end 7a of the sleeve 5 is a tapered coupling nut 14 which is formed internally to provide a seat 15 upon which rests, in accordance with the present invention, an apertured disk 16 of any suitable material. The disk 16 constitutes a valve seat and is provided with an opening 18 at the center thereof.

Threaded on the upper end of the sleeve 5 is a plug 19 which is preferably of the shape shown.

In addition to the barrel 8 the sample holder includes an elongated tube 23 that extends through the barrel 8 and at one end extends beyond the end 9 of the barrel 8 to provide a spear point 24. Above the point 24 the lower end of the tube 23 is provided with perforations 25 through which the sample material enters the tube 23.

At its upper end the tube 23 extends into the string section 13 and has suitably secured to its upper end as by being threaded thereon, or in any other suitable manner, a valve cage 26a in which works a ball check valve 26.

Confined on the barrel 8 between the members 14 and 19 is a series of packer rings 27 of any suitable material spaced from one another through the medium of suitable spacer rings 28 as shown.

A perforated pipe 29 is provided and through this pipe the sample of oil, gas, salt water or the like passes from the well to pass, in a manner hereinafter made manifest, into the lower end of the barrel 8.

The invention as just described has been described more fully in my herein identified copending application.

The present invention differs from the invention forming the subject matter of the above identified co-pending application for patent in that, in accordance with the present invention, there is provided a short tubular valve casing 30 that has one end threaded into the nut 14 and a relatively opposite end threaded for receiving a coupling sleeve 31 which sleeve is also threadedly engaged with the perforated pipe 29 for coupling the pipe 29 to the valve casing 30 as clearly shown in Figures 1 and 2.

In the lower end thereof the valve casing 30 is provided with a spider 32 forming a valve stem guide that accommodates a valve stem 33. On its upper end the valve stem 33 is provided with a frusto-conical valve element 34 that is normally seated against the edges of the opening 18 in disk 16 through the medium of a suitably provided coil spring 35.

Further in accordance with the present invention barrel 8 is provided at diametrically opposite sides thereof with outwardly and downwardly extending branches 36 in which are confined outwardly opening ball check valves 37. The branches 36 open into the atmosphere and are provided for the circulation of mud and the like in the usual manner without contaminating the contents confined within the elongated internal tube 23 forming part of the sample holder as hereinbefore described.

The operation and utility of the invention will be understood from the following:—

When the end of the perforated pipe **29** comes into contact with the bottom of the well, the drill string **13** is rotated whereby to thread the barrel **8** downwardly relative to the sleeve **5**. As the barrel **8** thus moves downwardly the point **24** will pass through the opening **18** in the disk **16** to engage the valve **34** to unseat the latter against the action of spring **35**.

The point **24** of the tube **23** is forced through the opening **18** downwardly to a point sufficient to provide a clearance between the point and the wall of the opening **18** which will permit the sample of oil, gas, or the like to flow upwardly and around the point **24** into the lower portion of the sleeve **5**. When this has been accomplished the barrel **8** is threaded further downwardly relative to the sleeve **5** until the largest end of the point **24** comes into contact with the wall of the opening **18** whereby to shut off communication between the pipe **29** and the sleeve **5**. It will thus be seen that when this is accomplished the sample material or fluid within the lower end of the sleeve **5** will pass into the tube **23** through the openings **25** and will become trapped within the tube **23**.

When the sample material has thus become trapped within the tube **23** a pump is connected to the top of the drill string for pumping the drill string full of mud. This mud will pass through the branches **36** and circulate about the drill string in the usual manner but the valve **26** in the upper end of the pipe **23** will prevent any of this mud passing into the tube **23** and contaminating the sample contents of the tube.

After a sample of the oil, gas or the like has been obtained in this manner the drill string may be raised and the testing device then uncoupled from the lower end of the drill string.

From the above it will be seen that provision has been made for obtaining a sample of oil, gas or the like in such a manner that the sample may be brought to the surface without at any time coming in contact with any foreign substance that would tend to contaminate the sample thus obtained.

Having thus described the invention what is claimed as new is:—

1. In a device of the class described, a barrel adapted to be secured to the lower end of a drill string, a sleeve threaded on the lower end of said barrel and relative to which said barrel is axially adjustable, said sleeve having a valve seat at the lower end thereof, and a sample entrapping tube extending longitudinally through said barrel, being integral adjacent one end with one end of said barrel and having at said one end a point and perforations above the point, the point of said tube adapted to pass axially through said valve seat, and means, displaceable by contact of the pointed end of said tube therewith, arranged at the lower end of said sleeve and normally engaging said valve seat for substantially completely closing said end of said sleeve.

2. In a device of the class described, a barrel adapted to be secured to the lower end of a drill string, a sleeve threaded on the lower end of said barrel, said barrel being axially adjustable relative to said sleeve, said sleeve having an apertured valve seat-disk at the lower end thereof, a valve casing connected with the lower end of said sleeve, a valve member working in said casing and cooperating with the valve seat, a sample entrapping tube extending longitudinally through said barrel, being integral adjacent one end with one end of the barrel and having at said one end a point adapted to pass axially through the apertured valve seat-disk to engage said valve member for unseating the latter, and said sample entrapping tube, adjacent the pointed end thereof being perforated.

3. In a device of the class described, a barrel adapted to be secured to the lower end of the drill string, a sleeve threaded on the lower end of said barrel, said barrel being axially adjustable relative to said sleeve, an apertured valve seat-disk, means engaging said sleeve and cooperating therewith for securing said valve seat disc to the lower end of said sleeve, a valve casing connected with the lower end of said sleeve, a valve member working in said casing and cooperating with the valve seat, a sample entrapping tube extending longitudinally through said barrel, being integral adjacent one end with one end of the barrel and having at said one end a point adapted to pass axially through the apertured valve seat-disk to engage said valve member for unseating the latter, said sample entrapping tube, adjacent the pointed end thereof being perforated, and a check valve on the upper end of the sample tube.

4. In a device of the class described, a barrel adapted to be secured to the lower end of the drill string, a sleeve threaded on the lower end of said barrel, said barrel being axially adjustable relative to said sleeve, an apertured valve seat-disk positioned against the lower end of said sleeve, a valve casing connected with the lower end of said sleeve, a valve member working in said casing and cooperating with the valve seat, a sample entrapping tube extending longitudinally through said barrel, being integral adjacent one end with one end of the barrel and having at said one end a point adapted to pass axially through the apertured valve seat-disk to engage said valve member for unseating the latter, said sample entrapping tube, adjacent the pointed end thereof being perforated, a check valve on the upper end of the same sample tube, packing elements encircling said sleeve, and means engaged with the sleeve for securing said packing elements in position on the sleeve.

5. In a device of the class described, a barrel adapted to be secured to the lower end of the drill string, a sleeve threaded on the lower end of said barrel, said barrel being axially adjustable relative to said sleeve, a valve casing connected with the lower end of said sleeve, a valve seat disc positioned between the confronting ends of said sleeve and valve casing, a valve member working in said casing and cooperating with the valve seat, a sample entrapping tube extending longitudinally through said barrel, being integral adjacent one end with one end of the barrel and having at said one end a point adapted to pass axially through the apertured valve seat-disk to engage said valve member for unseating the latter, said sample entrapping tube, adjacent the pointed end thereof being perforated, a check valve on the upper end of the same sample tube, packing elements encircling said sleeve, means engaged with the sleeve for securing said packing elements in position on the sleeve, and a perforated pipe having an end alined with and connected to said valve casing.

ERNEST H. COX.