

May 11, 1937.

G. J. LABARRE

2,079,941

CORE CATCHER RETAINER AND SEAT FOR A CORE BARREL

Filed Nov. 21, 1935

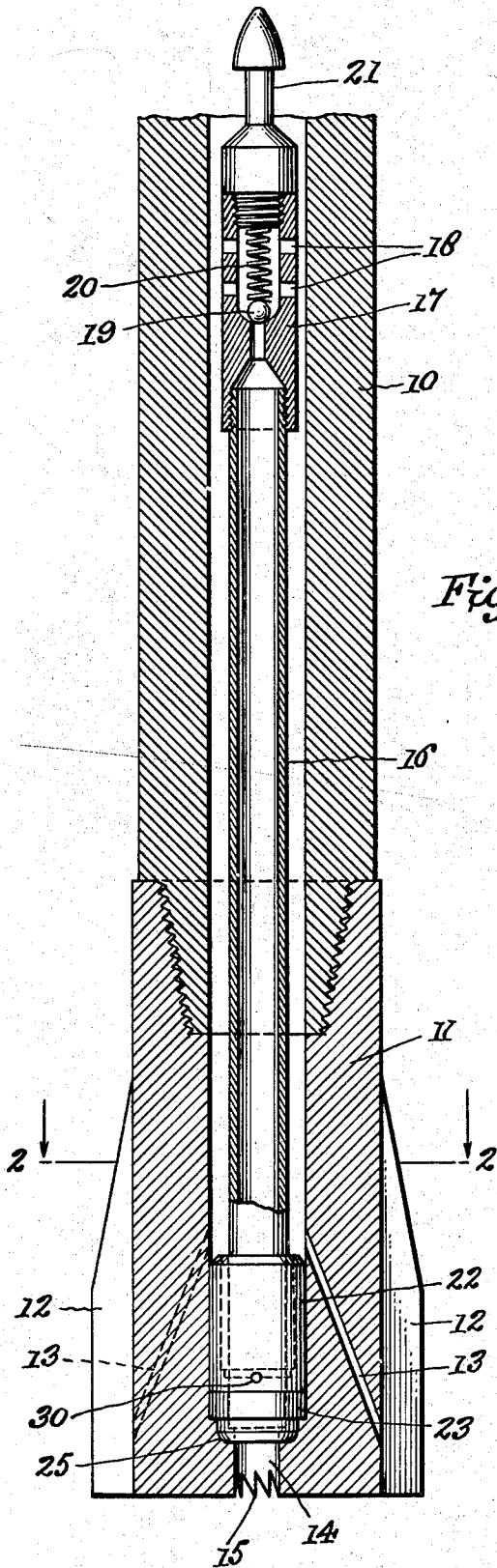


Fig. 1.

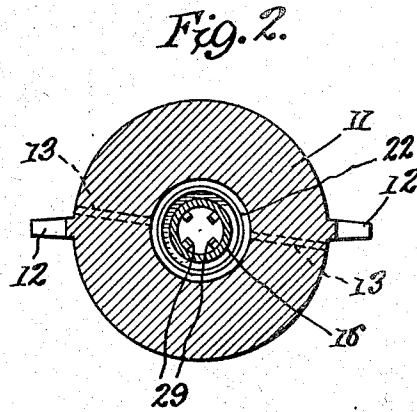


Fig. 2.

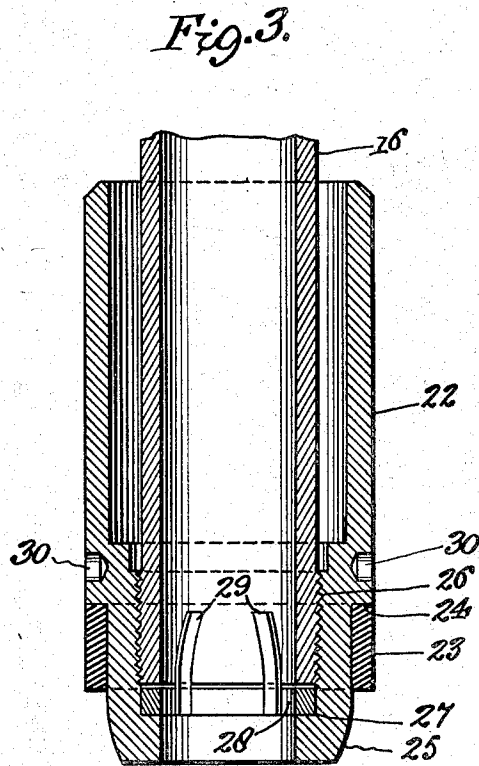


Fig. 3.

Inventor
Gustave J. Labarre
By
Wilkinson & Mawhinney
Attorneys

UNITED STATES PATENT OFFICE

2,079,941

CORE CATCHER RETAINER AND SEAT FOR
A CORE BARREL

Gustave J. Labarre, Poincortville, La.

Application November 21, 1935, Serial No. 50,941

3 Claims. (Cl. 255—72)

The present invention relates to a core catcher retainer and seat for a core barrel of the type in which the core taker is dropped into the drill stem and the core taken without removing the drill from the well.

An object of the invention is to provide an integral structure to be fastened to a core barrel and which at once serves to hold the core catcher in position and to provide a seal with the drill bit.

Another object is to eliminate the use of devices to lock the core taker in the drill bit.

The following additional objects are accomplished:—

The core barrel may be any piece of pipe having the proper diameter and threaded at each end; the core taker is sealed against the flushing liquid; the wear is taken by an elastic ring which prevents damaging of the other parts and which is readily renewable; the core catcher is always free to revolve; and the device is to be used with conventional type equipment.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a sectional view of a drill collar and bit and a core taker made according to the present invention.

Figure 2 is a transverse section taken on the line 2—2 of Figure 1, and

Figure 3 is a detail section of the retainer and seat.

Referring now to Figure 1, 10 designates a drill collar which is affixed to the bottom of the drill stem and rotated with it. The drill collar 10 carries at its lower end the drill bit 11 which holds the cutting blades 12. This drill bit is provided with channels 13 for lubricating and flushing the cutting surfaces of the cutter blades 12. In the type of drill bit to be used there is a central bore 14 for the purpose of admitting a core taking tool and the bit is provided at the lower end of this bore with a cutter head 15 for taking the core as the bit is advanced.

The usual core taking tool consists in a barrel 16 on the top of which is fitted a valve cage 17 for the purpose of draining the core barrel 16 as it is dropped through the drill stem. For this purpose the cage 17 is provided with outlet ports 18 in its sides and with a conventional ball valve 19 which seats at the top of a duct communi-

cating with the core barrel and which valve is urged to closed position by the spring 20. To the upper end of the assembly is fastened a spear 21 which is used in retrieving the core taker from the bit.

The head of the drill bit cuts out the core as it advances into the ground and forces it up thru the bore 14. As a rule a lubricating and flushing liquid is circulated down thru the same bore before being forced out in front of the cutter blades 12 thru the channels 13. When taking a sample core it is, therefore, necessary to seal the core barrel and the sample from this fluid in the bore. This seal has been formed in various ways before, such as by using a set of rubber cups around the core barrel. There is also required in a core barrel a core catcher which serves to retain the core in the barrel as it is drawn up thru the drill stem. In the most practical type of core catcher the retaining members remain stationary with the core while the core barrel and complete drill assembly rotate around it. This requirement for relative movability necessitates the provision of a seat or channel in which the catcher may freely revolve.

The device which comprises the object of the present invention combines the fluid seal required to prevent contamination of the sample core and the core catcher retaining groove or seat into a single article which fulfills these purposes in a manner far superior to the separate devices formerly employed and in addition accomplished a number of other objects. The form illustrated consists in a cylindrical body portion 22 one end of which (the lower end as used) is reduced to provide a seat for a sealing ring 23 of rubber or other flexible material. The ring 23 is subjected to an upward thrust in use and the body 22 is therefore provided with the downwardly facing shoulder 24 to provide a backing for the ring against this thrust. The body 22 is again reduced below the ring to form the downwardly tapering shoulder 25 which rests on the core cutter head 15 at the end of the drill bit. Internally the device is bored to receive the core catcher and the core barrel 16. The upper part of the bore is made of greater diameter than the outside of the core barrel 16 so that it passes thru the body freely. At a lower point, in the neighborhood of the sealing ring 23, the bore is reduced and threaded for a distance to receive the threaded end of the core barrel, forming the socket 26. Below the socket 26 the bore is smooth for a space and then is reduced

to form a shoulder 27. There is thus formed a groove or annular retainer between the end of the core barrel 16 and the face of the shoulder 27 in which is placed the core catcher consisting of a ring 28 and spring fingers 29 secured thereto. The distance between the end of the core barrel in position and the face of the shoulder 27 is fixed to suit the type of catcher to be used and must be such that the ring is free to revolve with respect to the retainer at all times.

For convenience in handling the retainer and seat is provided with a set of spanner holes 30. The use of a spanner wrench protects the surface of the device from the roughening resulting from the use of a wrench of the Stillson type.

The structure of the device is thus seen to be very simple and foolproof. In assembling the core taker it is only necessary to drop the catcher into position in the retainer and screw onto the barrel. It will be noted that the socket 26 is located at the lower end of the bore; this causes the force of the core barrel to be exerted directly against the sealing ring 23 and the surface 25. Likewise the upper part of the bore is larger than the barrel permitting flexing of the barrel in the socket as the retainer and seat adjusts itself in the bit.

This retainer and seat is designed to be used with a drill bit of the type in which the cutter head is built at the end of the bore provided for core taking and in such a bit the device will rest on the cutter head and on the usual shoulder provided a short distance above the head. The lower end of the retainer is tapered to seat against the cutter head while the rubber ring 23 is provided to form a seal with the seat of the drill bit. The only requirement as to size of the drill bit is that the core taking bore be not a great deal larger than the smallest tool joint in the drill stem as the diameter of the core taker including the seats in the drill bit otherwise there will be no seal formed.

The core taker to be used with the present device consists in the ordinary valve cage and over-shot spear assembly but may have for a core barrel any length of pipe of suitable diameter having threads at each end. The upper end is secured into the valve cage assembly and the lower end into the retainer and seat. It will thus appear that as any piece of pipe may be used the length of the core to be taken may be varied at will.

Whereas formerly the core barrel required to be machined and was of expensive construction so that it was not practical to have various sizes of core barrels. Before the core barrel is fastened to the retainer a core catcher of the conventional ring type is dropped onto the seat below the threaded inner portion of the retainer and then when the core barrel is secured into position the catcher is held in an annular track which is designed to be of sufficient height so that the catcher will always be free to revolve.

The retainer will be made of a high grade forged steel and heat treated for hardness. In addition to this the points which will receive the greatest amount of wear will be protected with a harder metal such as stellite. The ring 23 will be made of rubber and may if desired be reinforced with fabric.

When in position in the drill bit it will be noted that the top of the retainer is below the inside port holes for the water containers 13 in the bit and therefore there are no channels required in

the retainer as are found in many of the retainers known in the art.

When it is desired to take a core the whole core taking assembly is dropped into the drill stem. As the core taker strikes the mud and water in the stem the ball valve 19 opens permitting flow through the barrel so that the taker may progress downward through the mud. When tool joints are encountered the rubber ring 23 absorbs the greater part of the shock thereby protecting both the taker mechanism and the joints. As the core taker enters the drill collar and bit the retainer will center up due to the closeness of its fit with the bore and will settle into position on the seat and against the core cutter head. When this position is reached the ball valve 19 will close and remain closed until forced open by the pressure of the core which is being introduced at the lower end of the barrel. As the core enters the barrel the catcher fingers 29 will engage it and remain stationary with it while the retainer and bit continue to rotate. When sufficient length of core has been taken the taker is fished out of the drill collar and raised to the surface. In the course of raising the core is held in the barrel by the spring fingers 29 of the core catcher.

Using this type of retainer on the core barrel eliminates the necessity of using the usual latch assembly to hold the barrel down, and rubber rings used to receive shock in the dropping of the barrel eliminate the renewal of expensive seats frequently necessary in other barrels. The bit used in connection with this retainer has the core cutter built right into it thus relieving the drilling operation from the necessity of carefully checking the weight carried on the bit which must be done when separate core cutters are used. The core cutter is reinforced as its wearing points by dressing and building up with hard metal just as is done with the cutter blades themselves. The advantages of this type of bit are numerous, it will drill faster and in gauge longer than the bit without the cutter head built into it, due to the control of water or mud. There is no danger of a core barrel becoming stuck due to the burning of the core cutter head as is the case where the core cutter head is secured to the core barrel. The bit to be used in connection with this core barrel can be of either box type or pin type, preferably box type and either two or more blades may be used on the gumbo bit. When used on a rock bit as many cutters may be employed as is thought desirable. The bit used will be drilled through center a small fraction of an inch larger than the outside diameter of the core catcher retainer so as to permit the retainer to drop in and be retrieved through the main body of the bit.

It is to be noted that this type of core taker operates regardless of the pump pressure used and also the speed at which the core is taken. Another advantage is that as the cutter head is not fast to the core barrel there can be no breaking of the core taking tool at the end of the drill bit.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. An integral core barrel attachment, com- 75

prising a cylindrical body portion having an integral inwardly extending flange at its lower end for supporting a core catcher and provided above said flange with an integral socket portion to receive the lower end of a core barrel and hold the same above the core catcher for confining the latter between the core barrel and the flange, said cylindrical body also having an exterior gasket supporting portion in the zone of said internal flange adapted to carry a sealing gasket to engage the seat in a drill bit, said cylindrical body further having a downwardly tapering portion below said gasket supporting portion for engagement in the drill bit below the seat thereof.

2. A core catcher retainer and seat for a core barrel for use in drill bits having a sample taking bore and an annular seat within the bore, comprising a hollow cylindrical body portion, core catcher retaining and core barrel seating means inside said body, said body being reduced externally near its lower end to provide a shoulder, and a seating and shock absorbing ring on the body against said shoulder, said ring adapted to rest on said annular seat and being of the same diameter as the body so as to lie flush with the sides of said body to exert the pressure of the apparatus directly on the said annular seat to seal against flushing liquid in the bore of said bit.

3. In combination with a drill bit having a central sample taking bore, a sample cutter at the end of the bore and an annular seat in the bore above the cutter; a core catcher retainer and seat for a core barrel comprising a hollow cylindrical body of a diameter substantially the same as that of the bore in the bit, said body having a downwardly directed external annular seating shoulder near its lower end, a seating and shock absorbing ring on the outside of said body against said shoulder for engagement on said annular seat in the bit, core catcher retaining means inside said body, and core barrel holding means inside said body.

GUSTAVE J. LABARRE.