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A. Z. BENDAR

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BARREL CLOSURE FOR SURVEY INSTRUMENT

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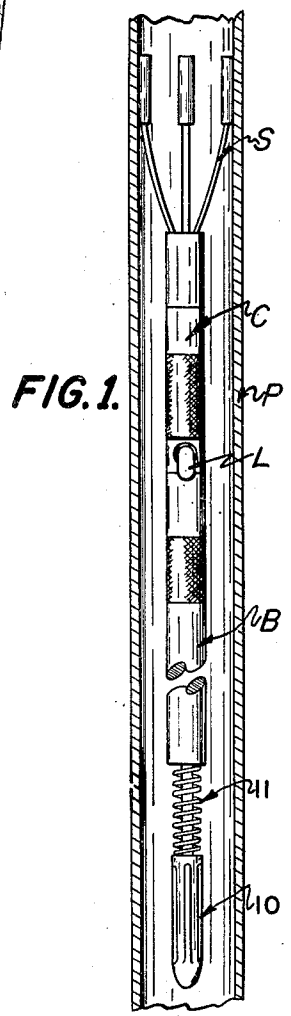


FIG. 1.

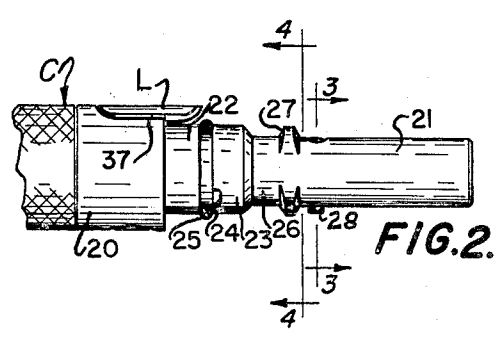


FIG. 2.

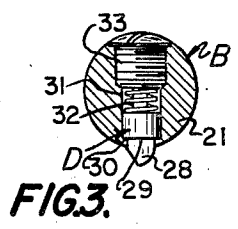


FIG. 3.

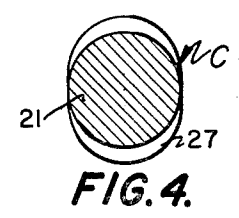


FIG. 4.

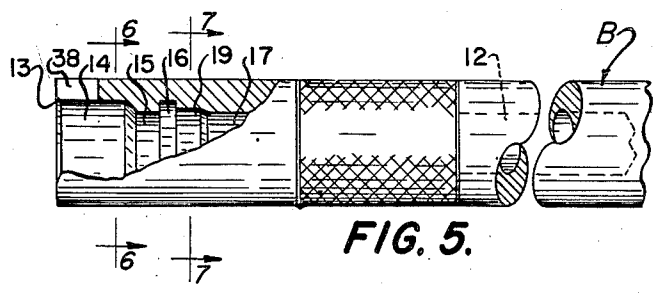


FIG. 5.

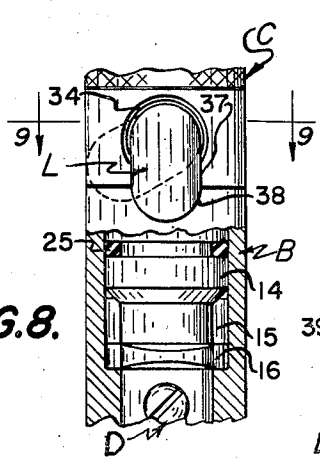


FIG. 8.

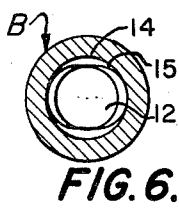


FIG. 6.

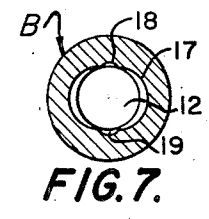


FIG. 7.

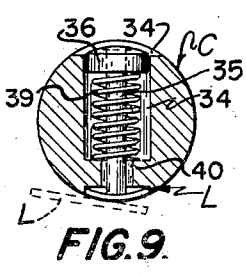


FIG. 9.

INVENTOR:
Arthur Z. Bendar.
BY *P. N. Lamphear*
ATTORNEY

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BARREL CLOSURE FOR SURVEY INSTRUMENT

Arthur Z. Bendar, Compton, Calif., assignor to Eastman Oil Well Survey Company, Denver, Colo., a corporation of Delaware

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3 Claims. (Cl. 220—40)

This invention relates to closures for tubular members and more particularly to a closure for the end of a barrel containing a survey instrument and designed for lowering into an earth bore to obtain certain desired data with respect thereto.

One of the objects of my invention is to produce a closure means for a tubular member which can be readily attached and detached and when attached will assure good sealing and be firmly held in place.

Another object is to produce a closure structure for an open end of a tubular member that will permit quick and easy attachment and detachment by simple longitudinal and turning movements.

A still further object is to produce a closure member for one end of a barrel or like member which will establish a sealed closing by a cylindrical portion thereof having a snug reception in a cylindrical bore of the barrel member, together with a yieldable seal member.

Yet another object is to produce a closure member of the kind above referred to which can be placed in closing position and held from any relative longitudinal movement with respect to the barrel by a turning movement to a predetermined position where it will be yieldably held.

A further object is to provide locking means for a closure of the type referred to which must be manually operated before the closure can be removed.

Other objects of my invention will become apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a view of a survey instrument barrel having a closure member for its upper end which embodies my invention;

Figure 2 is a side view of the closure member showing it removed from the barrel bore;

Figures 3 and 4 are enlarged cross sectional views taken on the lines 3—3 and 4—4, respectively, of Figure 2 showing details of the construction;

Figure 5 is a view of the end of the barrel which receives the closure member, parts being broken away to show details;

Figures 6 and 7 are enlarged cross sectional views taken on the lines 6—6 and 7—7 of Figure 5;

Figure 8 is an enlarged front view of the lock, together with a sectional view showing the extension section of the closure member in its operative position in the special bore of the barrel; and

Figure 9 is a cross sectional view taken on the lines 9—9 of Figure 8 showing additional details of the lock.

Referring to the drawings in detail, Figure 1 discloses a survey instrument being dropped through a pipe into an earth bore to make a survey thereof. This instrument is being "go-deviled" down the pipe P and it comprises a tubular barrel B in which the survey instrument has been positioned. The instrument barrel at its lower end has a nose 10 which is connected to the barrel through a spring 11 so that upon landing of the barrel and instrument, the instrument will be cushioned and the delicate

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devices therein, used to make the desired survey, will not be injured. The upper end of the barrel is arranged to be closed by a closure member or plug member C. This member carries on its upper end a suitable stabilizer S which is removable so that other devices can replace it, such as a "spear" for receiving an overshot device on a cable to hook it onto the instrument barrel and retrieve it if desired.

All the above-described structure is only incidental to my invention as the invention relates primarily to means for quickly and efficiently connecting and disconnecting the closure member to the barrel so the survey instrument can be placed in the barrel and removed therefrom with the least inconvenience, while at the same time having a barrel which will be well sealed against entry of foreign material to the barrel. In accordance with my invention, the closure member C can be attached to the barrel by merely inserting an extending portion thereof into a special bore in the upper end of the barrel and then turn the closure member relatively to the barrel. To remove the closure member, the movements are made in reverse. When the closure member is fully attached, it is yieldably held by a detent means. If positive locking is desired, there can be provided additional easily controlled means to accomplish this.

As best shown in Figure 5, the upper end of the barrel B has an axial bore 12 extending inwardly from the top a suitable distance. The outer end of this bore has a slightly tapered or conical section 13 to facilitate entry of an extension on the closure member. Beyond this is a short cylindrical section 14 of uniform diameter and inwardly thereof is a reduced section 15 of special cross section which is shown in detail in the cross sectional view of Figure 6. The bore part of this section 15 is generally oblong, having parallel sides and semi-cylindrical ends, the radius of curvature of which is the same as the radius of curvature of the cylindrical section 14.

Inwardly beyond the section 15 is another cylindrical section 16 which is quite short and has the same diameter as the cylindrical section 14 and this diameter is the same as the length of the major axis of the oblong section 15.

Still further inwardly in the bore 12, beyond the cylindrical section 16, is another section 17 having an oblong cross section the same as that of section 15 with its major axis lying in the same longitudinal plane, all as illustrated in the two cross sectional views of Figures 6 and 7. The bore 12 extends into the barrel beyond section 17 to receive the survey instrument in its special casing. The section 17 on its opposed straight sides is formed with shallow grooves 18 and 19 which extend in the axial direction of the bores. These grooves are for receiving the end of a detent, as will become apparent.

Referring now to Figures 2, 3 and 4, the closure member with its structure for cooperating with the special configuration of bore 12 in the barrel will now be described. The closure member's body 20 has a special axial extension 21. This extension adjacent the body has two cylindrical sections 22 and 23 which are of a length and diameter to fit the cylindrical section 14 of the barrel bore 12 just described. Between these sections 22 and 23 is the groove 24 for receiving a sealing member 25 which is shown as an O-ring made from rubber, synthetic rubber or other suitable material.

Outwardly of the cylindrical section 23, which, as shown, has its end chamfered to permit easy entry into the cylindrical section 14 of the barrel bore by cooperating with the tapered end 13, there is a reduced cylindrical section 26. This section is followed by a section 27 of oblong cross sectional shape providing opposed laterally extending lugs on the extension 21. The size of this

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oblong section is such that it can freely pass through the oblong section 15 of the barrel bore, providing the major axes of the oblong extension section and the oblong bore section are properly aligned.

Beyond the oblong section on the extension part which is to go into the bore section 17 is a detent D comprising a nose member 28 positioned to extend radially from the surface of the extension. Said nose has a shoulder 29 engageable with a shoulder 30 on the end of the cross bore 31 in which the detent is positioned. A spring 32 biases the nose outwardly, yet permits it to be pushed inwardly so its end can be flush with the extension surface. A threaded plug 33 closes bore 31 and acts as a backing for the spring. The outer end of the nose of the detent is suitably tapered and rounded so it can engage in the groove 18 of the section 17 of the barrel bore, or it could also engage in the groove 19 of a hand operated lock, to be described, should not be employed. It will be noted that the axis of the detent is in the same direction as the major axis of the oblong section 27.

From the foregoing description of the details of the closure member C and the bore of the barrel B, it is believed to be apparent that the barrel can be positively sealed, yet the closure member can be quickly and easily attached or removed. To attach the closure member to the barrel, the extension 21 is merely inserted into the bore 12 and then turned. In making the insertion, the extension is positioned with respect to the barrel so that the lugs provided on the oblong section 21 will pass through the oblong section 15 of the bore and to a position therebehind in the cylindrical section 16 of the bore. During insertion of the extension, the detent will have such a position that the nose will move into the oblong section 17 of the bore in a free manner.

When the extension on the closure member is fully inserted into the bore 12 to where the body of the closure member engages the end of the barrel, then the closure member can be given a ninety degree rotation with respect to the barrel and this will then lock the closure member against any longitudinal movement with respect to the barrel. As the closure member is rotated, the nose of the detent will be depressed by riding up the cylindrical surface at the end of the oblong section 17 of the bore and then snap into a groove to yieldably hold the closure member from rotation. When the detent is in a groove, the ears of the oblong section 27 on the extension are placed behind the opposed straight-sided walls formed by the oblong section 15 of the bore. The O-ring seal on the extension, when the closure member is in closing position, will yieldably engage the wall of cylindrical section 14 and this assures a fluid tight seal.

In some cases it may be desirable to positively lock the closure member in its yieldably held closed position. This can be accomplished by structure shown in Figures 2, 5, 8 and 9. The closure member body has a bore 34 in which is positioned a pin 35 having a large head 36 at one end of the bore. The other end of the pin has secured thereto an elongated latch plate L with round ends. This latch plate is secured at one end to the pin and during its locking action is arranged to lie in a recess 37 in the surface of the body of the closure and a recess or slot 38 in the wall of the barrel at the open end of the bore 12. The recesses are so positioned that when the closure member is in the yieldably held closing position with the detent in groove 18, the recesses will be aligned and the latching plate can be turned to fit in both recesses, thus extending across the meeting edges of the body of the closure member and the end of the barrel and positively preventing any relative turning between the two. The latch will be held in the recesses by the action of a spring 39 surrounding the pin 35 and interposed between its head 36 and a shoulder 40 at the latch plate end of the bore. To perform unlatching, the head of the pin need only be pushed inwardly, thus pushing the latch plate out of the recesses to where it can be turned to the

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dotted position indicated in Figure 8. The closure member is now free to be turned.

When the positive locking latch is employed, there will be no use of the groove 19 shown in Figure 7 as the detent must be turned to enter groove 18 to have the latch receiving recesses aligned. However, when the latch is not desired to be employed, the groove 19 is useful, for then the closure member may be rotated in either direction relative to the barrel to obtain a yieldably held closing action after the extension is fully inserted in the bore of the barrel.

To facilitate relative turning of the closure member and barrel by the hands, they can be provided with knurled gripping surfaces as shown.

From the foregoing, it is seen that I have provided a closure means for a barrel or like member that can be quickly attached and detached by simple longitudinal and rotative movements. A tight sealing action is provided and when the closure member is in its final closing position, it cannot be displaced by any relative longitudinal movement between it and the barrel. The yieldable detent arrangement assures there cannot be any easy relative rotation between the closure member and barrel that may cause detachment. Furthermore, when required, a positive locking can be accomplished and the structure thereof is easy to operate.

The above disclosure is to be considered as an example only of structure embodying my invention. I am aware that modifications and changes can be made without departing from the fundamental principles of my invention and, therefore, I desire it to be understood that the scope of my invention is not to be limited except in accordance with the appended claims.

What is claimed is:

1. In a closure means of the class described, a chambered member provided with a bore including a substantially cylindrical portion at its outer end and therebeyond a part extending inwardly toward the axis of the bore, and a plug member provided with a main body and an extension having a first substantially cylindrical section for close fit in the cylindrical portion of the bore and a second substantially cylindrical section of reduced diameter extending from the first cylindrical section, said second section having an outwardly extending part that upon insertion of the extension into the bore when the two are in one position with respect to one another said outwardly extending part can move axially past the inwardly extending part on the bore wall to a point beyond and thus allow relative rotation between the chambered member and the plug member to a second position whereby the outwardly extending part is behind the inwardly extending part and thereby longitudinal movement of the extension from the bore is prevented, said chambered member and the main body and extension being in telescoping relationship and having abutting portions with adjacent external openings when the last mentioned condition is present, yieldable detent means carried by the second section and further removed from the first section than the outwardly extending part, said bore having a recess in its inner wall surface for receiving said detent means to yieldably hold said plug and chambered members in said second position whereby accidental disengagement is prevented, and a manual and positive latch operable independently and separately from said detent means for positively preventing relative rotation from the yieldably held position, said last named means comprising a latch element carried by one of said chambered and plug members and arranged to fit and be held in said openings when the members are in said second position.

2. A carton as in claim 1 wherein the intermediate yieldable detent means includes a portion mounted for reciprocation within the plug member, said last named portion being biased by means within the plug member to normally force a part of the detent means to extend radially from the surface of the plug member.

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3. Closure means as defined in claim 1 wherein the latch element is provided with spring means to bias the element into the openings, the element being flush with the outer surfaces of the members when positioned in the openings, said latch element being provided with means for moving it out of said openings by manual pressure applied in a direction opposite the action of said spring means and including a pivot pin having a part exposed on the member which carries the latch element and on the side thereof opposite the latch element.

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