March 7, 1944. B. W. SEWELL 2,343,805

PRESSURE CORE BARREL

Filed Nov. 15, 1941

FIG. 1.

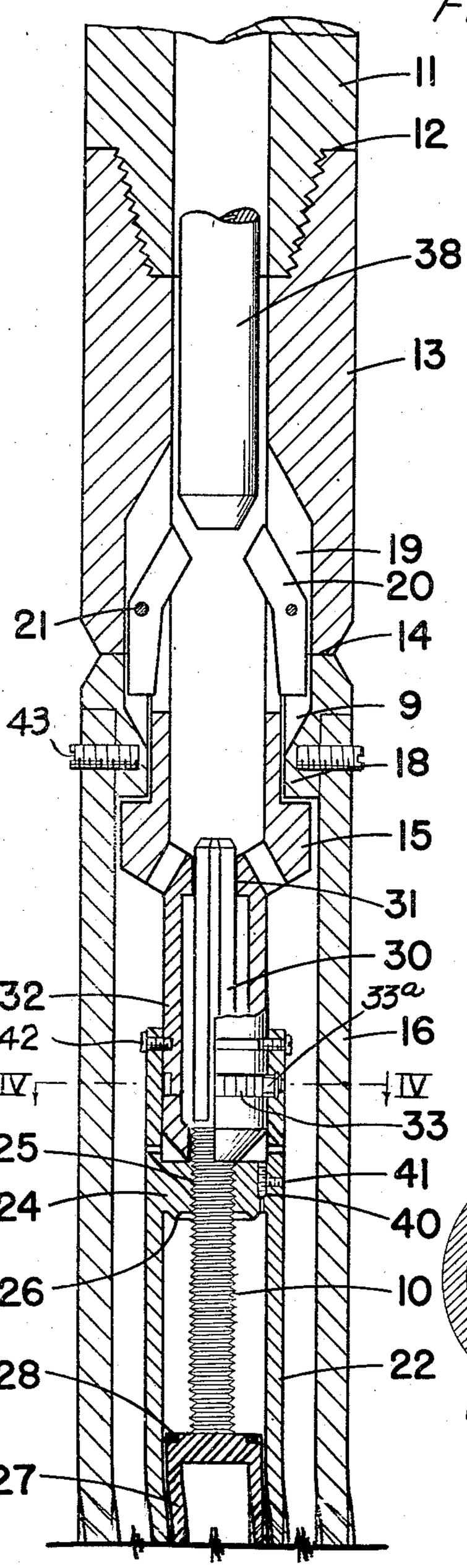


FIG. 2.

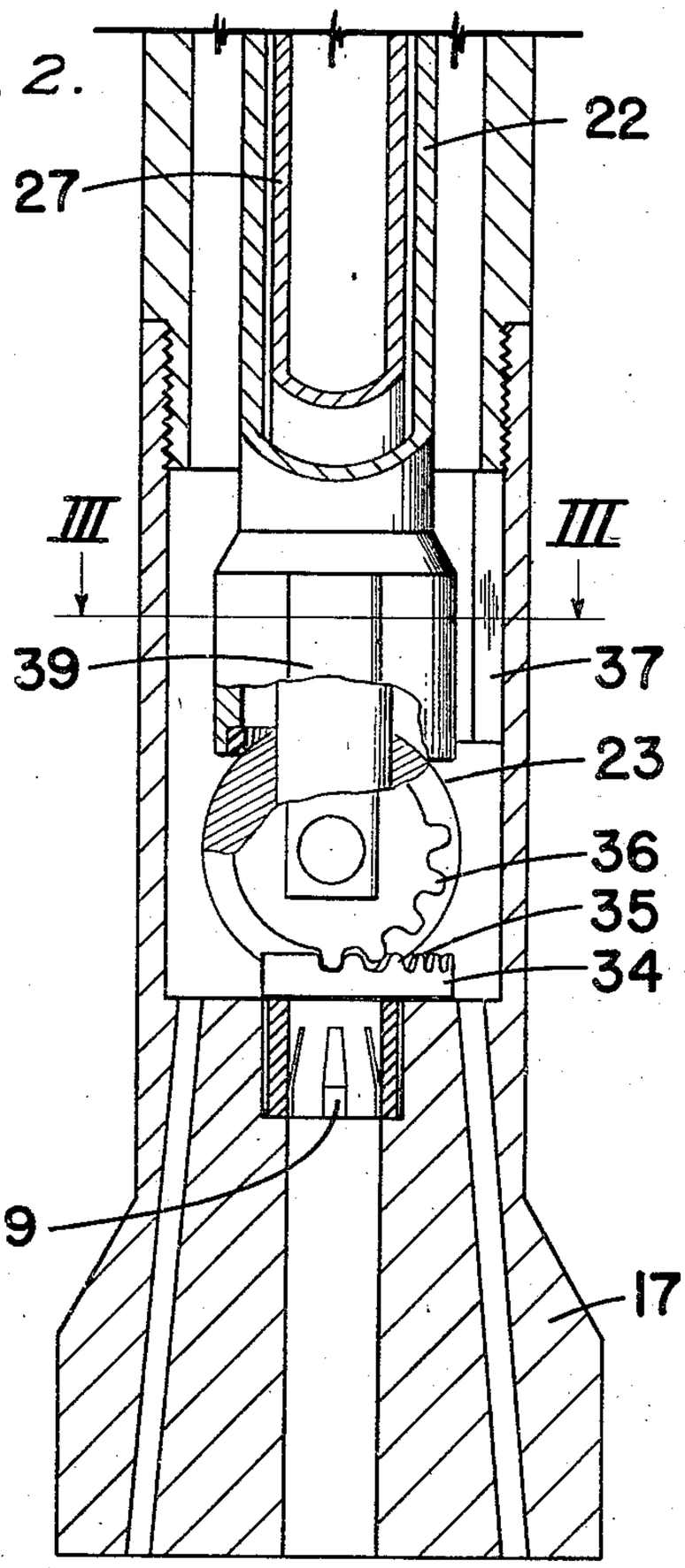


FIG. 4.

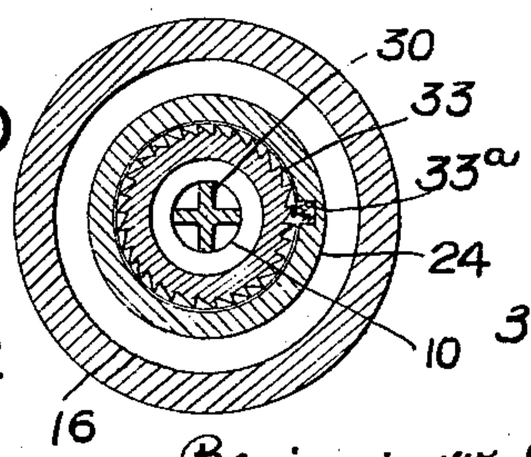
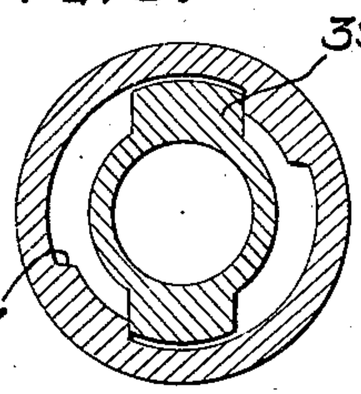


FIG. 3.



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PRESSURE CORE BARREL

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4 Claims. (Cl. 255—72)

The present invention is directed to a device for taking cores, sealing them under the pressure at which they are cut, and withdrawing them to the surface while retaining them under pressure.

An object of the present invention is to devise an improved means for sealing a core under the pressure at which it is obtained at the bottom of the bore hole preparatory to removing it to the surface of the earth.

Another object of the present invention is to produce a pressure core barrel provided with a sealing means arranged to be operated by dropping an object down the drill stem followed by rotating the drill stem.

Other objects and advantages of the present invention may be seen from the following description taken in conjunction with the accompanying drawing in which

Figs. 1 and 2 constitute together a side view, partly in section, of a coring device according to the present invention; and

Fig. 3 is a cross section along the line III—III of Fig. 2.

Figure 4 is a cross section along the line IV—IV of Figure 1.

Referring specifically to the drawing, attached to the lower end of a string of drill pipe 11, by suitable means such as collar 12, is an elongated cylindrically shaped member 13. A lower portion of member 13 is reduced in section to form shoulder 14. The reduced portion is provided with outwardly extending ledge 15. Another tubular member 16 of substantially the same dimensions as member 13 is arranged with its upper portion abutting shoulder 14 and its lower portion carrying core bit 17. The upper portion of member 16 is provided with inwardly extending ledge 18 which cooperates with ledge 15 to prevent relative longitudinal movement of members 13 and 16. Longitudinally extending slots 19 are cut in the lower portion of member 13 and similar slots 9 are formed in the upper portion of member 16. Arranged within slots 19 are dogs 20 secured by pivots 21. It will be apparent that members 13 and 16 are arranged so that longitudinal movement between the two members is impossible and that they will rotate together as a unit while dogs 20 engage slots 9, and so that they will rotate independently when the dogs are out of contact with the lowermost member. Suitable means for releasing the dogs to allow such independent rotation will be described hereafter. To allow the device to be disassembled readily the upper portion of member 16 is provided with a joint with screws 43 arranged to hold together the two portions thereof.

Arranged within outer cylindrical member 16 is pressure tube 22 having at its lower end a ball valve 23 and at its upper end a block 24 provided with a screw threaded passage 25 and downwardly extending annularly shaped seat 26. A core receiving tube 27 is arranged for longitudinal movement within pressure tube 22. The upper portion of the core tube is provided with annular gasket 28 arranged to cooperate with member 26 to form a pressure-tight seal when the core receiving tube is in its upper-most position. The lower portion of the core receiving tube is provided with conventional core catcher 29.

Secured to the upper end of core receiving tube 27 is rod-like member 10 having its lower portion provided with screw threads mating with the screw threads of passage 25. The upper portion of this rod-like member is provided with splines 30. Rod 10 extends through a keyed passage 31 in the lower portion of member 13.

Coupling the upper end of pressure tube 22 with member 13 is the tubular shaped member 32 extending downwardly about rod 10. Cap screws 42 extend through an upper portion of pressure tube 22 with their inner ends fitting in a corresponding track in member 32. Tubular member 32 is provided with ratchet teeth 33 cooperating with dog 33*a* secured to the pressure tube 22 so that when member 32 is rotated to the right the ratchet will be ineffective, but when the direction of rotation is reversed, the ratchet will be operative and drive pressure tube 22. Within the core bit is an upwardly extending circular track 34 secured to the core bit by suitable means, such as screws or pins, not shown, and having teeth 35 arranged to cooperate with pinion gear 36 with which ball valve 23 is provided.

The lower portion of pressure tube 22 is provided with laterally extending lugs 39 arranged to cooperate with the inwardly extending lugs 37 of the core bit to limit the relative rotary movement between pressure tube 22 and core bit 17 to a maximum of 90°.

When it is desired to take a core with the device of the present invention, the parts are arranged in the position as shown in Fig. 1 of the drawing and lowered into the bore hole. The drilling fluid is circulated and the core bit rotated in the right hand direction to cut a core as is conventional to the art. It will be apparent that in cutting, the core members 13 and 16 rotate as a

unit and the remaining parts are retained in the position shown in Figure 1 while the core is being cut.

After a suitable length of core has been obtained, member 16 is unlatched from member 13 by suitable means, such as dropping a bumper bar 38 down the drill stem. When the bumper bar comes in contact with dog 20, it pushes the upper end of these dogs outwardly forcing the lower ends out of slots 9 and allowing relative rotary movement between members 13 and 16. The core is then withdrawn within the pressure tube by rotating the drill stem in the right hand direction. This rotation is transmitted to rod 10 through keyed passage 31 and causes it to turn while pressure tube 22 remains stationary. The rotation of threaded member 10 withdraws the core containing core tube 27 within the pressure barrel so that its lower end is above lower valve 23 and the gasket 28 at its upper end seats against annular ring 26 forming a pressure-tight seal at the upper end.

After the core tube has been withdrawn and its upper end sealed, the direction of rotation of drill stem 11 is reversed. This reversed rotation is transmitted through ratchet 33 to pressure barrel 22 turning ball valve 23 by virtue of the relative movement between ring 34 and pinion 36. Upon rotating the pressure tube through an angle of 90° the lower valve 23 becomes completely closed and further movement is prevented by shoulder 36 contacting shoulder 37. The sealing of the core is now completed and the core may be withdrawn to the surface and its contents examined. The gaseous contents of the core may be removed through passages controlled by needle valve 40 and plug 41 as is now well known to the art.

While I have disclosed a specific embodiment of the present invention, it will be apparent that changes in the size, shape and arrangement of the various parts of the device may be made without departing from the scope of the invention. For example, while I prefer to proportion the device so that a relative rotation of 90° between the pressure tube and the core bit rotates the lower valve of the device to a completely closed position, it will be obvious that any predetermined degree of rotation may be used to close the valve. It will be apparent that other similar changes may be made in the construction of the device, and it is my intention to embrace such a change in the hereto appended claims.

I claim:

1. A pressure core barrel adapted to be arranged in a drill stem adjacent a core bit comprising, in combination, a first cylindrical member, a second member for receiving a core arranged for longitudinal movement with respect to said first member, means adapted for rotating said second member with respect to said first member, means arranged for withdrawing said second member within said first member upon said rotation, means arranged for sealing the upper end of said first member upon rotation of said second member with respect to said first member, and means arranged for sealing the lower end of said first member upon rotation of said first member with respect to the core bit.

2. A pressure core barrel adapted to be arranged in the lower end of the string of drill stem adjacent a core bit for receiving a core comprising, in combination, a pressure tube, a valve arranged at the lower end of said pressure tube controlling admittance into the end of said tube, a sample receiving member arranged within said pressure tube for longitudinal movement therein, means arranged for releasing said drill stem from said core bit to allow relative movement between said barrel and said bit, means for withdrawing said sample receiving member and for sealing the upper end of said pressure tube upon rotation of said drill stem in one direction after it has been released from the core bit, and means for sealing the lower end of said pressure barrel upon reversing the direction of rotation.

3. A core receiving device adapted to be arranged within a drill stem adjacent a core bit comprising, in combination, a barrel, means adapted to release said core bit from said drill stem to allow relative rotary movement between said barrel and said bit, means arranged to seal the upper end of said barrel in a pressure-tight manner after the drill stem has been released upon the rotation of the drill stem in one direction, and means arranged for sealing the lower end of said pressure barrel in a pressure-tight manner upon rotation of the drill stem in the opposite direction.

4. A device for taking samples under pressure adapted for use with a core bit attached to the lower end of a string of drill pipe comprising, in combination, a first tubular member adapted to have one end secured to the drill pipe, a second tubular member adapted to have an end secured to the core bit, means securing the other ends of said members together to define a continuous conduit and allow relative rotative movement between said members while preventing relative longitudinal movement, releasable means secured to said first member for locking said two members against relative rotative movement, a pressure barrel within said first member having its lower end open to communicate with the core receiving passage of the drill bit, a valve controlling the entrance into the pressure barrel from the core receiving passage of the drill bit, a threaded passage in the upper end of said pressure barrel, a core receiving tube arranged for longitudinal movement within said pressure barrel, a rod-like member attached to the upper end of said core receiving tube having a portion threaded to cooperate with the threaded passage of said pressure barrel and another portion arranged to cooperate with said first member to be driven thereby, and withdraw the lower end of said core receiving tube wholly within the pressure tube when the locking means is released and the drill stem is rotated in a predetermined direction, means arranged for transmitting rotary motion from said first member to said pressure barrel when the direction of rotation is reversed, and means arranged to close the valve controlling the entrance into the lower end of the pressure barrel when the pressure tube has been moved through a predetermined angle upon the said reversed rotation of the drill stem.

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