July 12, 1955 J. C. STOKES 2,712,922

CORE DRILL

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Fig. 1

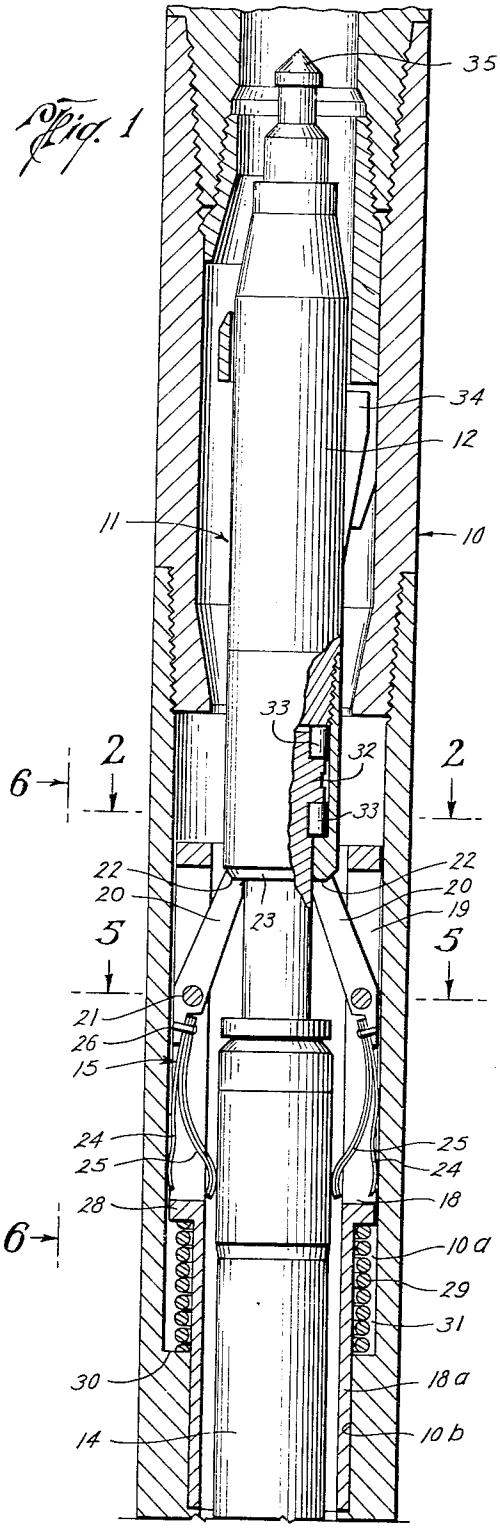


Fig. 1A

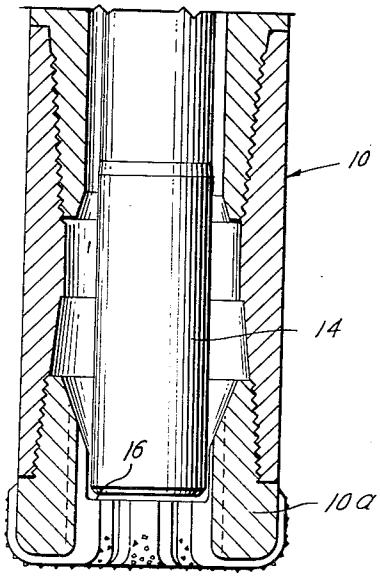
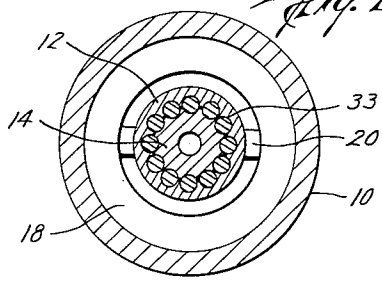


Fig. 2



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Fig. 3

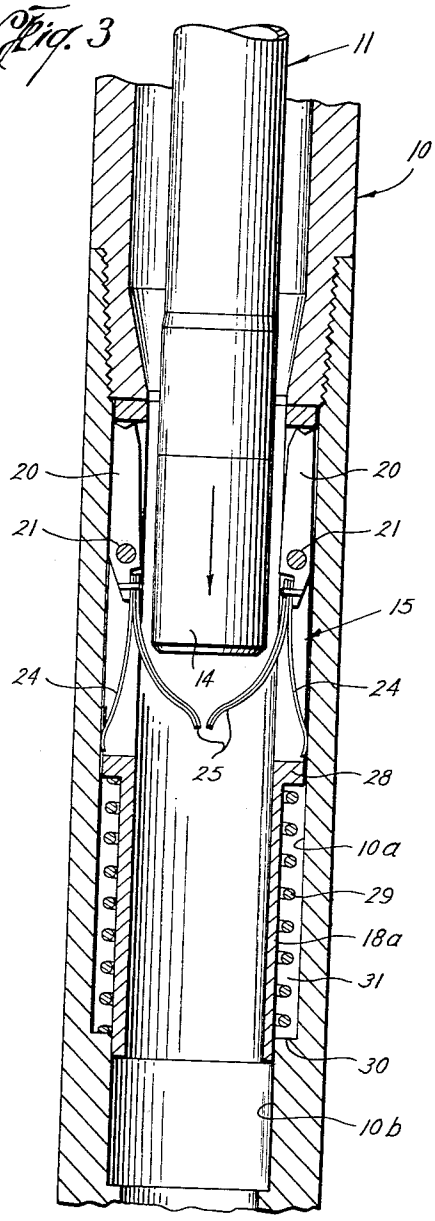
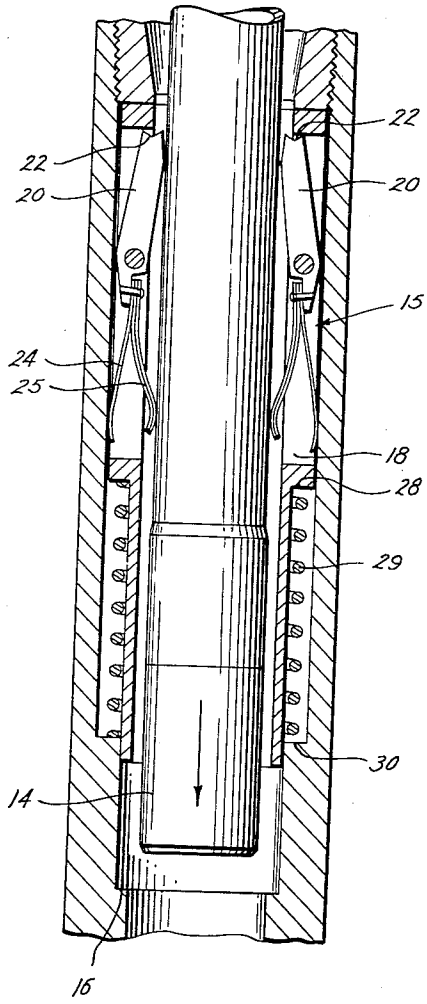


Fig. 4



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Fig. 5

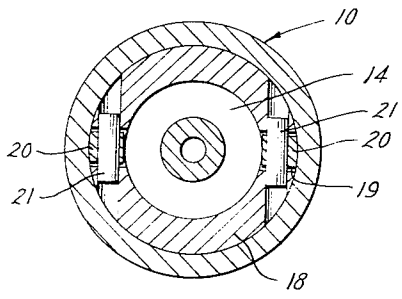


Fig. 6

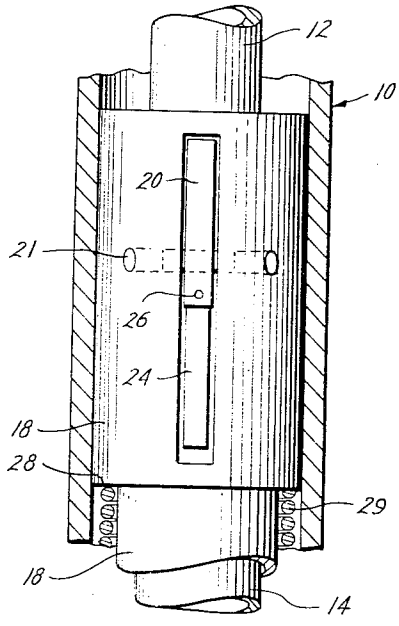
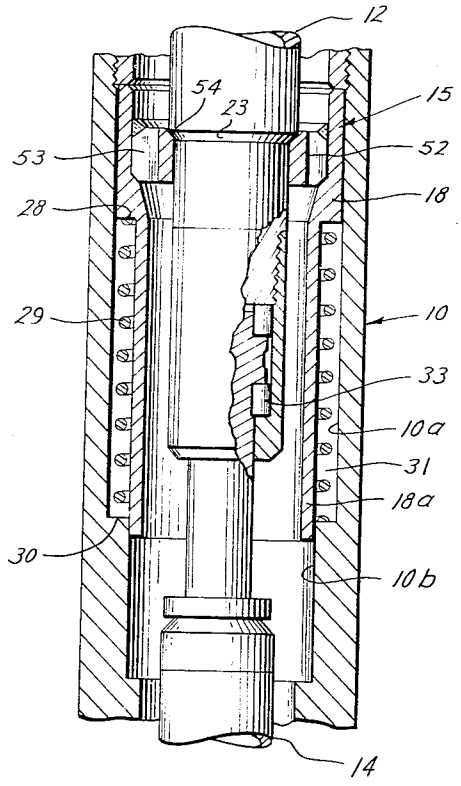


Fig. 7



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CORE DRILL

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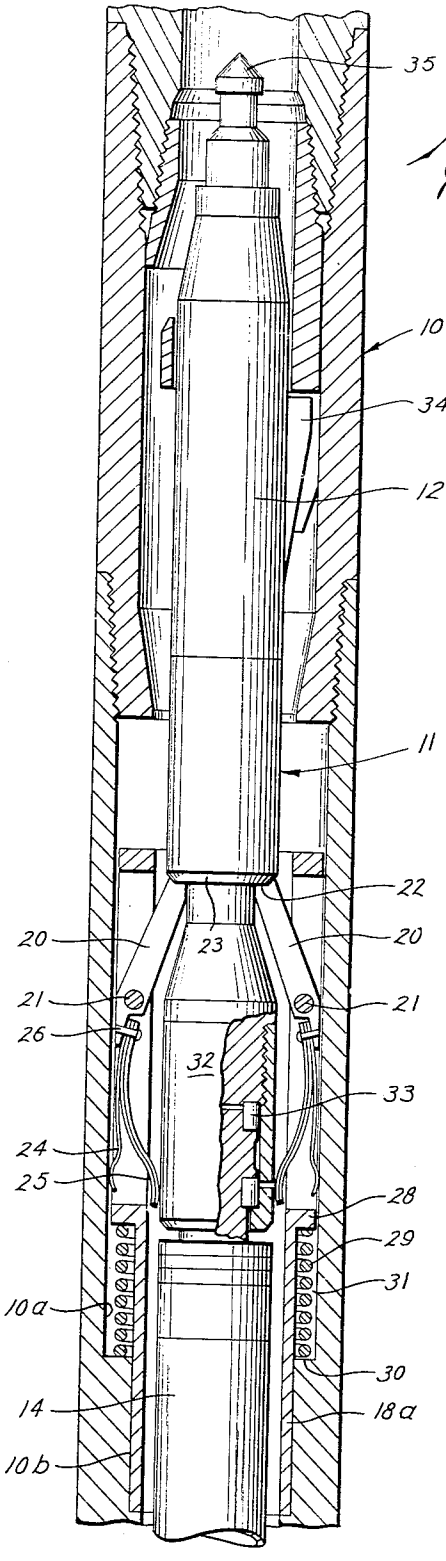


Fig. 8

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United States Patent Office 2,712,922
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2,712,922

CORE DRILL

John C. Stokes, Houston, Tex., assignor to Reed Roller Bit Company, Houston, Tex., a corporation of Texas

Application May 31, 1952, Serial No. 290,972

12 Claims. (Cl. 255—72)

This invention relates to new and useful improvements in a core drill apparatus and relates particularly to a supporting assembly for the inner core barrel unit.

It is an object of this invention to provide a core drill apparatus wherein an inner barrel is suspended in an outer barrel so that the portion of the inner barrel receiving the core can remain stationary at all times when a core is being cut, thereby eliminating breakage and other damage to the core.

An important object of this invention is to provide a core drill apparatus having a retractable inner barrel supported in an outer barrel by a suspension means and including a shock absorber to buffer the impact of the inner barrel when it is seated on the suspension means.

It is another object of this invention to provide in a core drill apparatus, a suspension means within the outer barrel including pivoted supporting elements which are normally in an outward position within the outer barrel, but which may be moved inwardly of the bore of the outer barrel to form a seat for an inner barrel; the arrangement preventing said element from restricting the bore diameter when in an inactive position.

A particular object is to provide a core drill apparatus wherein a retractable inner core barrel is supported in an outer barrel by an improved suspension means, whereby the inner retractable core barrel is spaced from and out of frictional engagement with the usual seat at the lower portion of the outer barrel or core bit, whereby frictional contact between the inner and outer barrels is minimized and the lower portion of the inner core barrel may remain stationary during rotation of the outer barrel and the upper portion of the inner core barrel.

Other and further objects of the invention will appear from the description of the invention.

The invention will be more readily understood by reference to the accompanying drawings, wherein an example of the invention is shown, and wherein:

Figures 1 and 1A are vertical sectional views, which together illustrate the complete core drill apparatus of this invention in one of its forms.

Figure 2 is a horizontal sectional view taken on line 2—2 of Figure 1, and illustrates the connection between the core barrel and the support barrel therefor.

Figure 3 is a vertical sectional view of a portion of the core drill apparatus of this invention, illustrating particularly the supporting means or suspension means for the inner barrel, with such means in the normal position prior to the inner barrel contacting the actuating springs.

Figure 4 is a vertical sectional view, similar to Figure 3, and illustrates the position of the suspension means after the inner barrel has urged the actuating springs outwardly to actuate the suspension means.

Figure 5 is a horizontal sectional view taken on line 5—5 of Figure 1, and illustrates the pivoted connection of the support arms on the suspension sleeve.

Figure 6 is a vertical view taken on line 6—6 of Figure 1, and illustrates the relationship of the pivot arms and the spring actuating means therefor.

Figure 7 is a vertical sectional view of the modified form of supporting means for the inner barrel.

Figure 8 is a vertical sectional view of the core drill apparatus of this invention, and illustrates another modified form of the suspension or supporting means for the inner barrel.

In the drawings, the numeral 10 designates the outer barrel of the core drill apparatus of this invention, which has a suitable bit 10*a* at its lower end. A retractable inner barrel 11, which is composed of a support barrel or carrier body assembly 12 and a core-receiving barrel 14 therebelow, is adapted to be mounted within the outer barrel 10 on a suspension or supporting means 15, whereby the inner barrel 11 is supported above the seat 16 at the lower end of the outer barrel which seat is shown as formed in the core bit 10*a*. By supporting the inner assembly on the supporting means 15, the frictional contact between the core-receiving barrel and the outer barrel is reduced to a minimum to assure that the core-receiving barrel 14 will remain stationary during the rotation of the outer barrel 10 and the upper support barrel 12. With such arrangement a core which enters the core barrel 14 is not damaged as would occur if such core barrel were rotated with the outer barrel 10.

In the form of the invention shown in Figure 1, the suspension or supporting means 15 includes a sleeve 18 which is axially slidable in the outer barrel 10. The sleeve 18 has suitable recesses 19 therein, in which support arms 20 are pivotally mounted on pins 21 extending transversely of the recesses in the sleeve 18. The upper end of each arm 20 is notched at 22 to form a supporting seat and said seat is adapted to be engaged by an external annular shoulder 23 on the inner barrel 11. Springs 24 and 25 have their upper ends secured, as by rivets 26, to the lower end of each arm 20 the spring 24 is adapted to contact the wall of the bore of the outer barrel while each spring 25 is curved inwardly to extend into the bore as illustrated in Figure 3. When the inner barrel 11 is not located within the outer barrel 10, the normal resiliency of springs 24, having only their lower ends engaging the outer barrel, functions to swing the arms 20 to a retracted or outer position whereby the full inside diameter of the outer barrel 10 is open for the reception of the inner barrel 11. The curved springs 25 are extending within the bore and serve as the actuating springs to swing or move the arms 20 to an active or inner position, as will be explained.

At the lower end of the sleeve 18, a tubular extension 18*a* is included which has substantially the same inside diameter but has a reduced outside diameter as compared to the rest of the sleeve 18 thereabove. An annular space 31 is formed between such tubular extension 18*a* and a bore portion 10*a* of the outer barrel 10 which has an increased inner diameter as compared to the rest of the bore 10*b*. The upper end of the space 31 is formed by a radial flange 28 on the sleeve 18 and the lower end is formed by a shoulder 30 on the outer barrel 10 which extends below the increased diameter bore portion 10*a*. Within such annular space 31 a fluid is confined which serves as the primary shock absorbing means. A spring such as the coil spring 29 is also confined within the space 31 and abuts the flange 28 and the shoulder 30 at its upper and lower ends, respectively, such spring 29 serving principally as a means for returning the sleeve 18 to its fully raised position (Figure 3) after the core-receiving barrel 11 is removed. Of course, the strength of the spring 29 can be varied as desired so that it will also function as a shock absorbing means with the fluid

in space **31** during the initial seating of the shoulder **23** on the arms **20**.

The inner barrel **11** is provided with a rotatable connection or swivel **32** which permits relative rotational movement between the upper support barrel **12** and the lower core barrel **14**. This rotatable connection **32** may include the roller bearings **33** as illustrated or any equivalent means such as "Hycar" ring or other suitable bearing means. The carrier body assembly **12** has associated therewith a latch means **34** which is of conventional construction and provides a connection between the carrier body **12** and the outer barrel **10**, whereby rotation of the outer barrel **10** is imparted to the carrier body **12**. At the upper end of the inner barrel **11** is a spear connection **35** for the lowering and raising of the retractable inner barrel **11** by a wire line or other suitable device.

In the operation of the core drill apparatus illustrated in the Figures 1 and 1A, the suspension means **15** is initially in its open or retracted position as best seen in Figure 3. In this position the springs **24** hold the arms **20** in their retracted position, whereby the diameter of the outer barrel **10** is unrestricted by the said arms and permits as large a core sample to be taken as is permitted by the practical limits of the outer barrel.

When the inner barrel **11** is lowered within the outer barrel **10** the lower end of the core-receiving barrel **14** contacts the actuating springs **25** which, as explained, extend into the bore, to force them outwardly and to in turn pivot the arms **20** inwardly as best seen in Figure 4. Thus, when the inner barrel **11** reaches the position shown in Figure 1, the pivoted arms **20** will have been moved into their inner position to provide a seat for the shoulder **23** of the inner barrel. The impact from the seating of the inner barrel **11** on the notches **22** of the arms **20** is absorbed primarily by the fluid in the annular space **31**, but preferably with the assistance of the spring **29**. As previously explained in the seated position (Figures 1 and 1A, the inner barrel **11** is supported by the support means **15** above, the lower shoulder seat **16** of the outer barrel **10**. This construction thus minimizes the frictional contact between the inner barrel **11** and the seat **16**, whereby upon rotation of the upper support barrel **12** with the outer barrel **10** the core barrel **14** remains stationary. When it is desired to retract the inner barrel **11** from the outer barrel **10** the spear coupling **35** is connected to a wire line or other grappling means whereby the latch means **34** is released in the well known manner, so that the inner barrel **11** may then be retracted from the outer barrel **10**. This of course permits the obtaining of the core sample from the core barrel **14** without removing the entire outer barrel **10** from the well bore. When the barrel **11** is removed, the spring **29** returns the support means **15** to its fully raised position (Figure 3).

In the form of the invention shown in Figure 7, the construction of the core drill apparatus of this invention is identical with that of Figures 1 and 1A except that the pivoted dogs or arms **20** with their related springs **24** and **25** as shown in Figures 1 and 1A have been replaced with a fixed support ring **52**. This support ring is welded or otherwise secured to the sleeve **18**. Openings **53** are provided in the support or slush ring **52** to permit the flow of slush therethrough. The ring has a beveled surface **54** upon which the shoulder **23** of the support barrel **12** seats. The operation of the device shown as Figure 7 would be substantially the same as that shown in Figures 1 and 1A, except for the operation of the suspension means **15**, as is believed evident.

The form of the device shown as Figure 8 is similar in construction to that shown in Figures 1 and 1A, with the exception that the connecting means **32** has been disposed below the shoulder **23**, whereby the actuating springs **25** contact the upper support barrel or carrier body assembly **12** in Figure 8 rather than the lower core barrel **14** as in Figure 1. Although the frictional contact of the springs **25** with the core barrel **14**, as shown in Figure 1, is generally not sufficient to cause rotation of the core barrel **14** with the outer barrel **10**, the form of the invention shown in Figure 8 eliminates any such possibility by having the springs **25** above the core barrel **14**. The operation of the device of Figure 8 would be identical with the operation of the device of Figures 1 and 1A.

It is thus believed evident that a core drill apparatus has been provided wherein a novel suspension means supports the inner barrel away from the lower seat in the outer barrel, whereby the core barrel of the inner barrel remains stationary during the rotation of the outer barrel.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. In a core drill apparatus having an outer barrel and a core barrel assembly therein, the improvement residing in a suspension means for said core barrel assembly, including a pivoted arm mounted on said outer barrel for supporting said core barrel assembly, and means for retracting said arm to an open position, whereby substantially the full inside diameter of the outer barrel is open to receive said core barrel assembly.

2. The apparatus as set forth in claim 1, which includes an additional means to force said pivoted arm into seating position upon contact with said core barrel assembly.

3. A core drill apparatus comprising, an outer barrel, a retractable inner barrel mounted therein and comprising a core-receiving barrel and a support barrel, a support means for said inner barrel including a pivoted arm, a resilient means for urging said arm into an open position, and an additional resilient means for forcing said arm into a seating position for seating the support barrel thereon, and maintaining said core-receiving barrel out of engagement with said outer barrel, whereby said core-receiving barrel remains stationary during rotation of said outer barrel and said support barrel.

4. The apparatus as set forth in claim 3, wherein said additional resilient means contacts said core-receiving barrel when said inner barrel is seated on said pivoted arm.

5. The apparatus as set forth in claim 3, wherein said additional resilient means contacts said support barrel when said inner barrel is seated on said pivoted arm.

6. A core drill apparatus including, an outer barrel, a sleeve member mounted within the outer barrel and resiliently supported therein, an inner core-receiving barrel insertable within the outer barrel and adapted to extend through said sleeve, and a pivotally mounted spring actuated retractable supporting means mounted on said sleeve and engageable by the inner barrel for supporting said inner barrel within said outer barrel.

7. A core drill apparatus including, an outer barrel, a pivotally mounted supporting element within the outer barrel and mounted thereon and adapted to be swung inwardly toward the center of the bore of the barrel, spring means connected with the supporting element for normally maintaining said element in a position adjacent the wall of said barrel, an inner core-receiving barrel insertable within the outer barrel, and means also connected with the supporting element and operable by engagement with the inner barrel for swinging the supporting element inwardly into the bore whereby said element may be engaged by the inner barrel to thereby support the latter in position within the outer barrel.

8. A core drill apparatus as set forth in claim 7, having spring means to actuate the supporting element to return it to its normal outward position when the inner barrel is removed from the outer barrel.

9. A core drill apparatus as set forth in claim 7, to-

gether with an annular sleeve within the outer barrel having the supporting element mounted thereon, and means for resiliently supporting said sleeve on the inside of the said outer barrel.

10. A core drill apparatus as set forth in claim 7, said inner core-receiving barrel consisting of an upper portion and a lower portion together with means for connecting the upper portion of the inner barrel to the outer barrel so that rotation of the outer barrel imparts rotation to the upper portion of the inner barrel, and a swivel connection in the inner barrel which permits the lower portion of said inner barrel to remain stationary while the upper portion thereof rotates.

11. A core drill apparatus including an outer barrel, an annular sleeve mounted within the bore of said outer barrel, resilient means supporting said sleeve, an inner core-receiving barrel insertable within the outer barrel and adapted to extend through said sleeve, and means carried by said sleeve and engageable by the inner barrel for supporting said inner barrel in position within the outer barrel.

12. A core drill apparatus including, an outer barrel,

a pivotally mounted supporting element within the barrel and adapted to be swung from a normal position adjacent the wall of the barrel to a position inwardly of the bore thereof, a curved spring secured to the element and engageable with the wall of the outer barrel and constantly exerting its force to urge the element into a normal position adjacent said wall, a second spring member also secured to the element and disposed inwardly within the bore of the barrel when the element is in normal position, an inner core-receiving barrel insertable within the outer barrel and engageable with the second spring member to swing the supporting element inwardly of the bore, and an abutment on said inner barrel adapted to engage the inwardly swung element, whereby the element supports said inner barrel within the outer barrel.

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