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Flarity et al.

[11] **3,825,083**

[45] **July 23, 1974**

[54] **DRILL BIT AND STABILIZER COMBINATION**

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[52] **U.S. Cl.** **175/394**, 175/325, 175/329

[51] **Int. Cl.** **E21b 9/36**, E21b 17/10

[58] **Field of Search** 175/394, 323, 325, 329, 175/330, 327, 403, 406, 412

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Attorney, Agent, or Firm—Bernard Kriegel

[57] **ABSTRACT**

A closely coupled bore hole drill bit and stabilizer combination includes a body structure adapted to be coupled to a rotary drill string or downhole motor, the body structure having cutting elements on its lower portion for drilling the bore hole, the upper portion of the body structure being surrounded by a separate stabilizer in juxtaposition to the upper end of the lower portion of the body structure, the stabilizer being removably coupled to the body structure, as through the agency of a clutch device, by a threaded coupling, or by welding, allowing readily uncoupling or disconnection of the stabilizer from a worn drill bit and its appropriate association with another operable drill bit.

18 Claims, 4 Drawing Figures

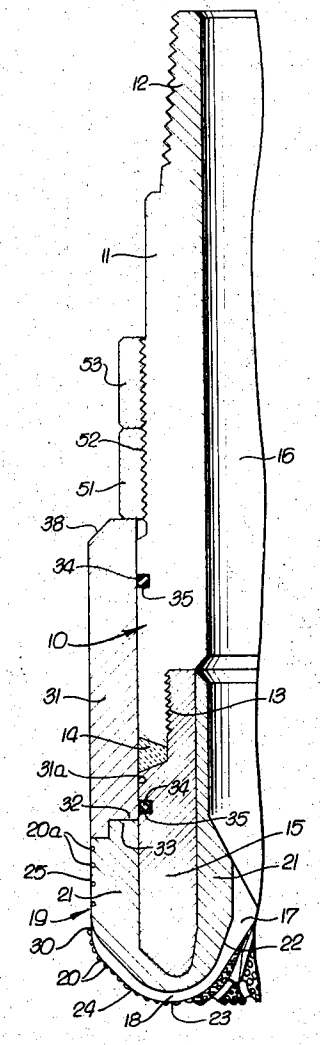

FIG. 1.

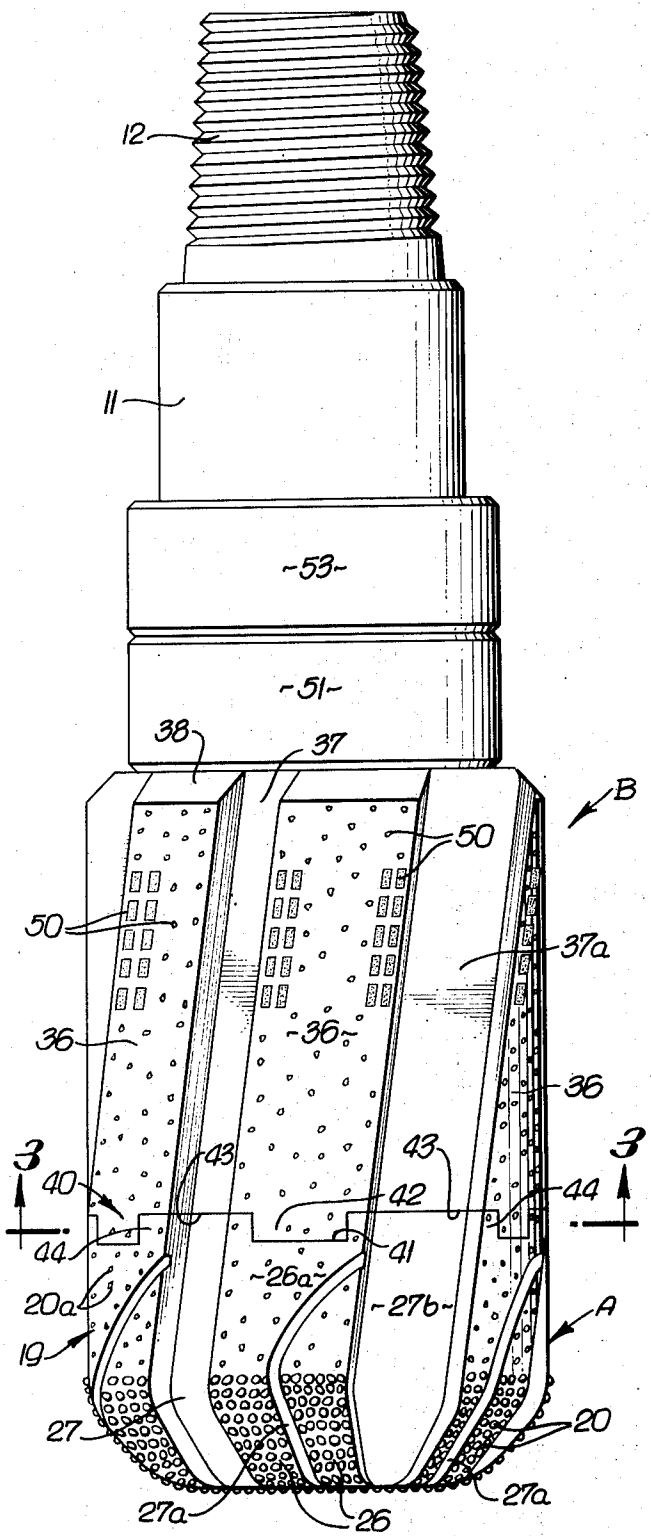
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FIG. 2.

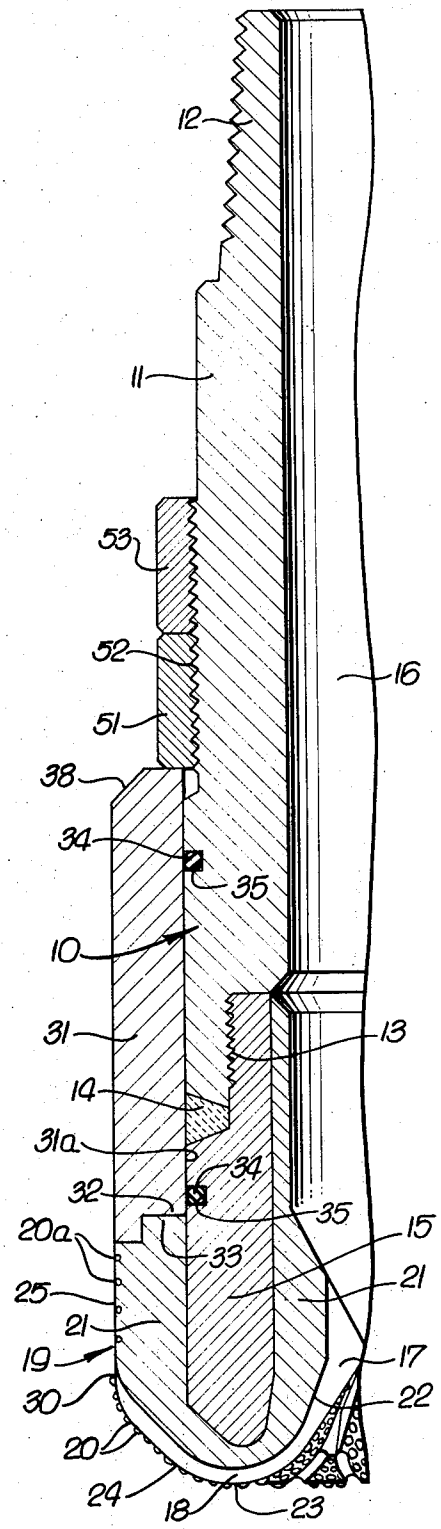
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FIG. 4.

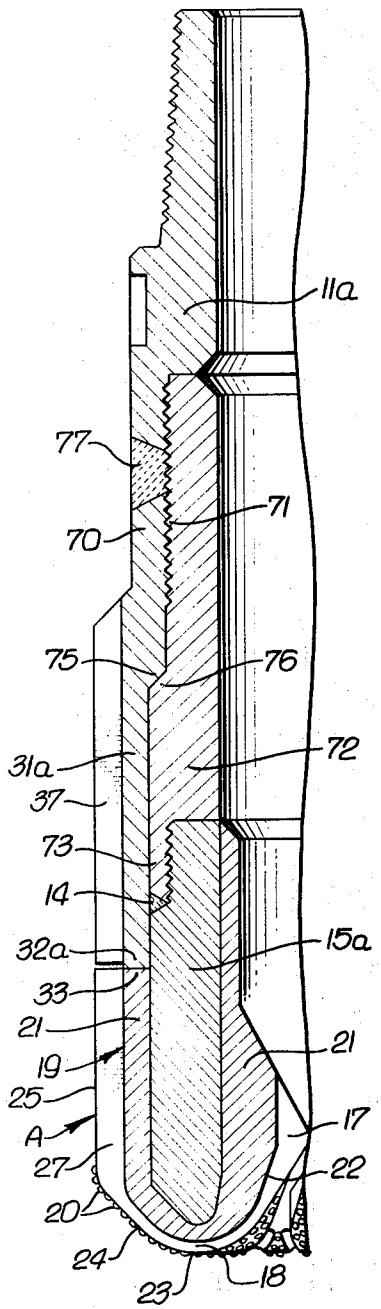
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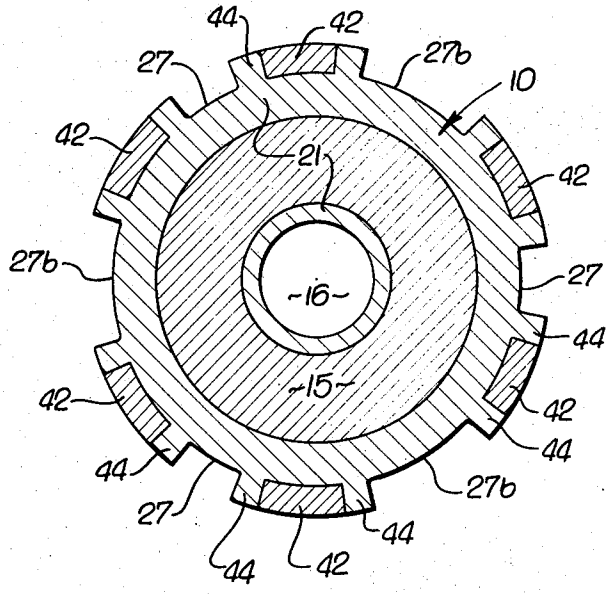
FIG. 3.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DRILL BIT AND STABILIZER COMBINATION

The present invention relates to rotary bore hole drilling devices, and more particularly to combinations of drill bits and stabilizers used in drilling bore holes, such as stabilizer and diamond bit combinations.

Rotary drill bit and stabilizer combinations are well known, the stabilizer having the purpose, as its name implies, of retaining the bit in a coaxial or centered position in the bore hole being drilled. Heretofore, the stabilizer has been threadedly connected to the lower end of a rotary drilling string, or a downhole motor, the lower end of the stabilizer being threadedly connected to the upper end of the drill bit that drills the hole. With the prior stabilizer and bit combinations, the bore hole being drilled by the bit may tend to deviate from the desired drilling direction; the bit may wobble, tending to drill a spiraled, oversize hole; it may form ledges in the hole; and it may cause excessive wear on and damage to the bit cutting elements, contributing to a slower drilling rate and to a lesser bit life.

By virtue of the present invention, a bit stabilizer combination is provided that results in the drilling of a truer and straighter bore hole. Wobbling of the bit, such as a diamond bit is eliminated, reducing the tendency of the bit to drill spiraled, oversized holes. Darting of the bit around the bottom of the bore hole is also eliminated, preventing ledges from being formed in the hole. Since the bit is caused to drill a truer size hole, its penetration rate into the formation is increased, excess wear of and damage to the diamonds or other cutting elements is avoided, contributing to a longer life of the bit.

The drill bit and stabilizer are closely coupled to each other, running truer and providing a longer life to the bearings of a downhole motor that might be used in rotating the bit and stabilizer combination, as well as reducing power losses inherent in the greater overall length of prior drill bit and stabilizer combinations.

In apparatus embodying the present invention, the stabilizer portion is rotatably driven directly by the body structure of the bit, the stabilizer being relatively easily disconnected from a worn bit and readily reconnectable to the body structure of a new bit, thereby enabling the stabilizer to outlast several drill bits, providing ready replacement in the field, if desired, of bits or stabilizers in the bit-stabilizer combination. With stabilizer-diamond bit combinations, the stabilizer, in effect, forms an upward continuation of the bit, the stabilizer pads or lands being positively alignable with the pads or lands on the reamer portion of the bit, the waterways or junk slots between the stabilizer pads also being aligned with the corresponding waterways or junks slots in the bit reamer portion, the stabilizer pads and junk slots forming upward continuations of the bit reamer pads and junk slots, respectively, there being no significant gaps between the stabilizer and bit reamer portion.

This invention possesses many other advantages, and has other purposes which may be made more clearly apparent from a consideration of several forms in which it may be embodied. Such forms are shown in the drawings accompanying and forming part of the present specification. These forms will now be described in detail for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense.

Referring to the drawings:

FIG. **1** is a side elevational view of a rotary drill bit and stabilizer combination embodying the invention;

FIG. **2** is a quarter longitudinal section through the apparatus illustrated in FIG. **1**;

FIG. **3** is a cross-section taken along the line **3—3** of FIG. **1**; and

FIG. **4** is a quarter longitudinal section taken through a modified form of drill bit and stabilizer combination.

As disclosed in the drawings, a combined drill bit and stabilizer includes a drill bit A for operation upon the bottom of a bore hole, drilling fluid flushing the cuttings from the bottom upwardly around the drill bit and a string of drill pipe (not shown) to which it is secured to the top of the hole. It also includes a stabilizer B for maintaining the bit coaxial of the bore hole. The combined drill bit and stabilizer includes a body or shank structure **10** comprising an upper section **11** having an upper threaded pin **12** for threadedly attaching the combination to the string of drill pipe. The upper section is attached by a straight threaded connection **13** and weld **14** to a lower section **15.** Circulating fluid pumped down through the drill pipe flows into a central or main passage **16** of the body structure of the tool and then flows through a plurality of circumferentially spaced longitudinally extending grooves **17** toward the bottom of the hole. The lower end of each fluid distribution groove communicates with one or a plurality of radial waterways **18** extending toward the outer gage portion **19** of the bit, the fluid flowing through such waterways and also across the cutting surface or face of the bit.

The body of the bit has diamonds or similar cutting elements **20** secured in its formation contacting face within a matrix **21,** of a suitable type, forming a portion of the bit body **10** and appropriately fused to its lower body section **15.** The central portion **22** of the bit illustrated is generally conical in shape with the side of the cone tapering in an upward and inward direction. The generally conical portion of the bit merges into a lower bottom contacting portion **23,** which, in turn, merges into an upwardly diverging conical face **24** terminating at the generally cylindrical reamer face **25** of the bit.

The drilling portion of the bit A is divided into a plurality of diamond set sections, lands or pads **26, 26***a* which extend outwardly from the region of the distribution grooves **17,** and which are defined by the waterways **18** extending from each groove toward the gage portion **19** of the bit. Thus, the waterways extend from the outlets of the distribution grooves **17** generally radially along the inner conical face portion **22,** lowermost face portion **23,** and outer conical face portion **24,** merging into vertical waterways or grooves **27, 27***b* in the reamer portion **19** of the bit body section **15,** the upper portions of some of the vertical waterways running transversely across the gage portions **19** and opening into circumferentially spaced vertical junk slots **27***b* in the reamer portion that extend upwardly through its upper end.

The inner conical portion **22** of the bit face has diamonds **20** set in its matrix **21** for operation upon the central portion of the hole. Similarly, diamonds are set in a predetermined pattern in the faces of all of the lands, the diamonds **20** terminating at the lowermost

end 30 of the outer gage or vertical reamer portion 19. Such reamer portion may have diamonds or other suitable cutting elements 20*a* in its matrix 21.

In the form of the invention illustrated in FIGS. 1 to 3, the stabilizer B is mounted on the bit body 10. This stabilizer is in the form of a sleeve unit 31 that can be slipped downwardly over the body or shank 10, with its lower end 32 bearing against the upper end 33 of the outer matrix 21 of the drill bit. The inside diameter of the stabilizer sleeve 31 conforms closely to the outside diameter of the upper body section 11 and of the upper portion of the lower body section 15, leakage of fluid between the sleeve and body sections being prevented by several elastomer seal rings 34, such as O-rings, disposed in circumferential grooves 35 in the body sections and bearing against the inner wall 31*a* of the sleeve. The sleeve has circumferentially spaced vertical lands or pads 36 formed thereon which are defined by intervening vertical waterways 37 and junk slots 37*a*. The stabilizer lands, waterways and junk slots conform in spacing and width with the waterways 27, junk slots 27*b* and lands 26*a* in the reamer or gage portion 19 of the lower drill bit and form upward continuations thereof, the stabilizer junk slots 37*a* and waterways 37 opening through the upper end of the stabilizer sleeve, with the lands 36 terminating at a tapered guide shoulder 38 inclined in a downward and outward direction.

Appropriate orienting of the stabilizer sleeve 31 with the lower drill bit A, to align the stabilizer pads, waterways and junk slots with the reader pads, waterways and junk slots, is secured through a clutch or coupling device 40. Thus, the outer part of the gage portion 19 has axial vertical grooves 41 therein in the vertical lands 19 that receive downwardly directed clutch dogs or teeth 42 integral with the stabilizer lands 36, the width of the dogs 42 and grooves 41 closely conforming and providing a rotatable driving connection between the bit A and the stabilizer sleeve 31. In effect, the stabilizer teeth or dogs 42 are formed by circumferentially spaced lower grooves 43 in the stabilizer sleeve which receive upwardly projecting dogs or teeth 44 of the reamer portion 19 of the bit, such reamer dogs defining the grooves 41 that receive the stabilizer axial dogs 42. It is to be noted that the widths of the dogs or teeth 42, 44 closely conform to the widths of the grooves 41, 43 so that a torque with substantially no play can be transmitted from the reamer bit dogs 44 to the stabilizer dogs 42. Not only do the interengaging clutch teeth or dogs 44, 42 serve to transmit rotation from the bit portion A of the tool to the stabilizer sleeve 31, but it serves to properly align the stabilizer pads 36, waterways 37 and junk slots 37*a* with the reamer pads 26*a*, waterways 27, and junk slots 27*b*, respectively of the bit. Preferably, the reamer pads and stabilizer pads and the waterways and junk slots therebetween are inclined so that 360° wall coverage can be obtained by the stabilizer and reamer portions of the bit combination. The stabilizer pads 36 have suitable hard material 50 embedded in their outer matrix portion, which may be diamonds, sintered carbide inserts, or combinations thereof.

The stabilizer sleeve 31 is rigidly secured to the bit body and also firmly coupled to the drill bit A by a jam nut 51 threaded downwardly on an externally threaded portion 52 of the bit body section 11, this nut being tightened until the inner or lower stabilizer sleeve portion 32 engages the upwardly facing shoulder 33 on the bit matrix 21, and with the stabilizer dogs 42 interfitting fully with the dogs 44 of the reamer portion 19 of the drill bit. The nut 51 is prevented from loosening from its tight position on the body of the bit by a lock nut 53 threaded on the threaded bit body portion 52 and tightened firmly against the jam nut 51.

In operation of the drill bit and stabilizer combination, the upper threaded pin 12 is secured to the lower end of the drill pipe string or downhole motor and is lowered in the bore hole being drilled to its bottom. Suitable drilling weight is imposed on the drilling string and body of the tool while the tool is rotated at the desired speed and drilling mud is circulated down through the drill pipe and through the central or main fluid passage 16 of the bit. The stabilizer pads 36 have the same bearing diameter as the vertical reamer pads 26*a* of the drill bit A and serves to center the drill bit in the hole, the cuttings being flushed by the drilling fluid toward the outer portion of the bit and through the waterways 27 and junk slots 27*b* of the bit, continuing upwardly through the waterways 37 and junk slots 37*a* of the stabilizer B, the drilling fluid also flowing across the several drilling pads 26*a* and the stabilizer pads 36 to cool them and also to clean them of cuttings.

The close coupled relationship between the stabilizer sleeve 31 and the drill bit portion A of the combination results in the drilling of a true and straight hole, wobbling of the drill bit portion being eliminated, which reduces the tendency of the bit to drill a spiraled oversize hole, as well as preventing ledges from being formed in the hole. Since the bit is drilling the desired size of hole, its penetration rate is increased, while the life of the bit is extended by avoiding excessive damage to its cutting elements or diamonds.

The stabilizer portion of the combination will outlast three to five diamond bits, enabling it to be used with a plurality of successive drill bits. Thus, after the apparatus has been withdrawn from the bore hole the stabilizer sleeve 31 is easily removed by unscrewing the lock nut 53 and jam nut 51 and slipping the stabilizer sleeve upwardly off the drill bit body section 11, enabling it to be slipped over another bit body and placed in clutched or coupled relation with another drill bit portion of the bit and stabilizer combination, the sleeve being secured in place by the jam and lock nuts 51, 53.

In the form of the invention disclosed in FIG. 4, the stabilizer sleeve 31*a* is not clutched to the drill bit portion. Instead, the sleeve has an upper threaded box 70 that is mounted on the external thread 71 of an intermediate body section 72, the lower end 73 of which is threaded to the lower body section 15*a*, also being attached thereto by a weld 14. The stabilizer sleeve 31*a* is threaded downwardly until its lower end 32*a* engages an upwardly facing shoulder 33 on the lower body section 15*a*, at which time the stabilizer pads 36, waterways 37 and junk slots 37*a* will be aligned with the companion pads, waterways and junk slots of the reamer portion 19 of the drill bit. When so aligned, a downwardly facing inner shoulder 75 on the stabilizer sleeve will engage an upper shoulder 76 on the intermediate body section 72.

The stabilizer sleeve 31*a* is firmly secured to the intermediate section 72 by threading an upper section 11*a* to the upper portion of the intermediate section 72 and then welding the upper section 11*a*, intermediate section 72 and sleeve 31*a* together by a circumferential

weld **77**, which is then turned off so that its periphery conforms to the peripheries of the upper section **11***a* and stabilizer sleeve **31***a*. The upper body section has a threaded pin **12** thereon for securing the bit structure to the lower end of a drilling string or drilling motor, by means of which the entire bit and stabilizer assembly is rotated.

In drilling the bore hole with the stabilizer and drill bit combination illustrated in FIG. **4**, the torque is transmitted from the drill string or motor through the upper body section **11***a* and intermediate body section **72** to the lower drill bit A. It is also transmitted from the upper body section through the intermediate body section and weld **77** to the stabilizer sleeve **31***a*, such that the stabilizer sleeve and drill bit rotate as a functionally integral unit.

The mode of operation and advantages of the assembly illustrated in FIG. **4** are essentially the same as in the other form of the invention, including the removability of the stabilizer sleeve **31***a* from the body structure and lower drill bit. Thus, the weld **77** can be cut away and the upper body section **11***a* unthreaded from the intermediate body section **72**, which then enables the stabilizer sleeve **31***a* to be unthreaded from the intermediate body section **72**, for use in combination with another and new drill bit.

We claim:

1. In a rotary drill bit and stabilizer apparatus for drilling a bore hole in a formation: a body structure having an upper connector adapted to secure said structure to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter and an outer gage portion of extended length integral with said lower cutting portion and having an effective diameter conforming to said predetermined bore hole diameter; a separate elongate stabilizer movable over said connector and along said body structure toward and into engagement with said outer gage portion; and means for securing said stabilizer to said body structure for simultaneous rotation with said lower cutting portion, said stabilizer having circumferentially spaced, externally arcuate elongate vertical pads providing a large bearing area with respect to the wall surface of the bore hole, said pads having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said stabilizer being contiguous the upper end of said gage portion, said stabilizer constituting an upward continuation of said gage portion.

2. In apparatus as defined in claim **1**; said stabilizer comprising an elongate sleeve having an effective outside diameter conforming to the predetermined bore hole diameter; said securing means securing said sleeve to said body structure for rotation by said body structure jointly with said lower cutting portion.

3. In apparatus as defined in claim **1**; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer waterways defining said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer waterways and stabilizer pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively.

4. In apparatus as defined in claim **1**; said stabilizer comprising an elongate sleeve having an effective outside diameter conforming to the predetermined bore hole diameter; said securing means securing said sleeve to said body structure for rotation by said body structure jointly with said lower cutting portion; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertically elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively.

5. In rotary drill bit and stabilizer apparatus for drilling a bore hole in a formation: a body structure having an upper connector adapted to secure said structure to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter and an outer gate portion of extended length integral with said lower cutting portion and having an effective diameter conforming to said predetermined bore hole diameter; a separate elongate stabilizer sleeve movable over said connector and along the exterior of said body structure above said outer gage portion toward and into engagement with said outer gate portion, said sleeve having circumferentially spaced, externally arcuate elongate vertical pads providing a large bearing area with respect to the wall surface of the bore hole, said pads having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said sleeve being contiguous the upper end of said gage portion, said sleeve constituting an upward continuation of said gage portion; and clutching means securing said sleeve to said body structure, whereby said cutting portion and sleeve rotate together.

6. In apparatus as defined in claim **5**; said clutching means comprising intermeshing axially extending dogs on the lower portion of said sleeve and upper portion of said gage portion.

7. In apparatus as defined in claim **5**; and means on said body structure engaging said sleeve for holding said sleeve downwardly and said clutching means engaged.

8. In apparatus as defined in claim **5**; said clutching means comprising intermeshing axially extending dogs on the lower portion of said sleeve and upper portion of said gage portion; and means on said body structure engaging said sleeve for holding said sleeve downwardly and said dogs intermeshed.

9. In apparatus as defined in claim **5**; and means on said body structure engaging said sleeve for holding

said sleeve downwardly and said clutching means engaged; and means threaded on said body structure above said sleeve and engaging the upper end of said sleeve for holding said sleeve downwardly and said dogs intermeshed.

10. In apparatus as defined in claim **5**; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively.

11. In apparatus as defined in claim **5**; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively; said clutching means comprising intermeshing axially extending dogs on the lower portion of said sleeve and upper portion of said gage portion; and means on said body structure engaging said sleeve for holding said sleeve downwardly and said dogs intermeshed.

12. In rotary drill bit and stabilizer apparatus for drilling a bore hole in a formation: a body structure adapted to be connected to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter, said lower cutting portion including an outer gage portion of an effective diameter conforming to said predetermined bore hole diameter; a separate stabilizer sleeve encompassing said body structure above said outer gage portion, said sleeve having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said sleeve being contiguous the upper end of said gage portion, said sleeve constituting an upward continuation of said gage portion; and clutching means securing said sleeve to said body structure, whereby said cutting portion and sleeve rotate together; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining spaced vertical elongate lands therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve lands being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively; said clutching means comprising intermeshing axially extending dogs on the lower portion of said sleeve and upper portion of said gage portion; and means threaded on said body structure and engaging the upper end of said sleeve for holding said sleeve downwardly and said dogs intermeshed.

13. In rotary drill bit and stabilizer apparatus for drilling a bore hole in a formation: a body structure having an upper connector adapted to secure said structure to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter and an outer gage portion of extended length integral with said lower cutting portion and having an effective diameter conforming to said predetermined bore hole diameter; a separate stabilizer sleeve movable over said connector and along the exterior of said body structure above said outer gage portion toward and into engagement with said outer gage portion, said sleeve having circumferentially spaced, externally arcuate elongate vertical pads providing a large bearing area with respect to the wall surface of the bore hole, said pads having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said sleeve being contiguous the upper end of said gage portion, said sleeve constituting an upward continuation of said gage portion; and means securing the upper portion of said sleeve to said body structure, whereby said cutting portion and sleeve rotate together.

14. In apparatus as defined in claim **13**; said securing means including a threaded connection between said body structure and upper portion of said stabilizer sleeve.

15. In apparatus as defined in claim **13**; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively.

16. In apparatus as defined in claim **13**; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in

said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleeve having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining said spaced vertical elongate pads therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve pads being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively; said securing means including a threaded connection between said body structure and upper portion of said stabilizer sleeve.

17. In rotary drill bit and stabilizer apparatus for drilling a bore hole in a formation: a body structure having an upper connector adapted to secure said structure to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter, said lower cutting portion including an outer gage portion of an effective diameter conforming to said predetermined bore hole diameter; a separate stabilizer sleeve movable over said connector and along the exterior of said body structure above said outer gage portion toward and into engagement with said outer gage portion, said sleeve having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said sleeve being contiguous the upper end of said gage portion, said sleeve constituting an upward continuation of said gage portion; and means securing the upper portion of said sleeve to said body structure, whereby said cutting portion and sleeve rotate together; said securing means including a threaded connection between said body structure and upper portion of said stabilizer sleeve; said securing means further including a weld integrating said upper portion of said sleeve to said body structure.

18. In rotary drill bit and stabilizer apparatus for drilling a bore hole in formation: a body structure having an upper connector adapted to secure said structure to a drilling string; said body structure having a lower cutting portion for drilling the bore hole to a predetermined diameter, said lower cutting portion including an outer gage portion of an effective diameter conforming to said predetermined bore hole diameter; a separate stabilizer sleeve movable over said connector and along the exterior of said body structure above said outer gage portion toward and into engagement with said outer gage portion, said sleeve having an effective diameter conforming to the diameter of said hole and outer gage portion, the lower end of said sleeve being contiguous the upper end of said gage portion, said sleeve constituting an upward continuation of said gage portion; and means securing the upper portion of said sleeve to said body structure, whereby said cutting portion and sleeve rotate together; said lower cutting portion including a fluid passage and spaced waterways in the end face of said cutting portion communicating with said passage and providing lands in said end face therebetween; cutting elements on said lands; said gage portion having spaced vertical waterways in its periphery communicating with said other waterways and providing spaced vertical lands therebetween; said stabilizer sleever having spaced vertical elongate waterways in its periphery aligned with and communicating with said vertical waterways of said gage portion, said stabilizer sleeve waterways defining spaced vertical elongate lands therebetween forming upward continuations of the vertical gage portion lands; the lower ends of said stabilizer sleeve waterways and stabilizer sleeve lands being contiguous the upper ends of said gage portion vertical waterways and vertical lands, respectively; said securing means including a threaded connection between said body structure and upper portion of said stabilizer sleeve; said securing means further including a weld integrating said upper portion of said sleeve to said body structure.

* * * * *

PO-1050
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,825,083 Dated July 23, 1974

Inventor(s) FRANK O'DELL FLARITY and WAYMON RHEA EUSTACE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 22: after "waterways" insert --defining--.

Column 10, line 1: after "in" insert --a--.

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents