

Oct. 21, 1952

C. C. GOOLSBEE

2,614,810

ROTARY BIT

Filed June 16, 1947

5 Sheets-Sheet 1

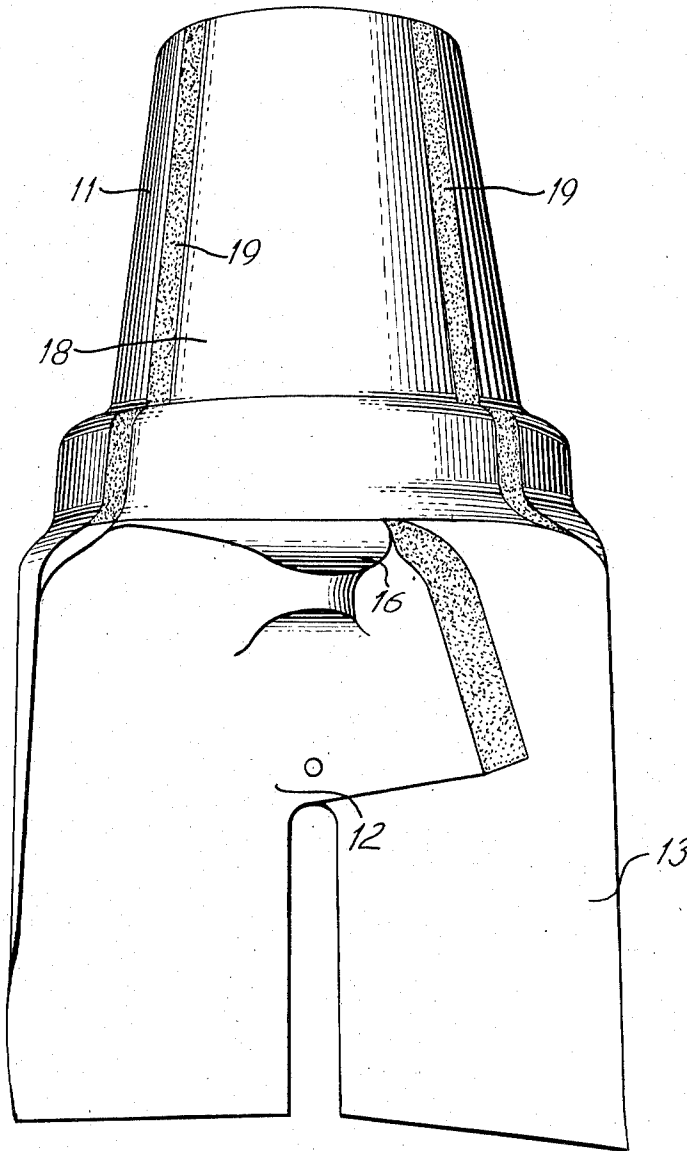


Fig 1

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5 Sheets-Sheet 2

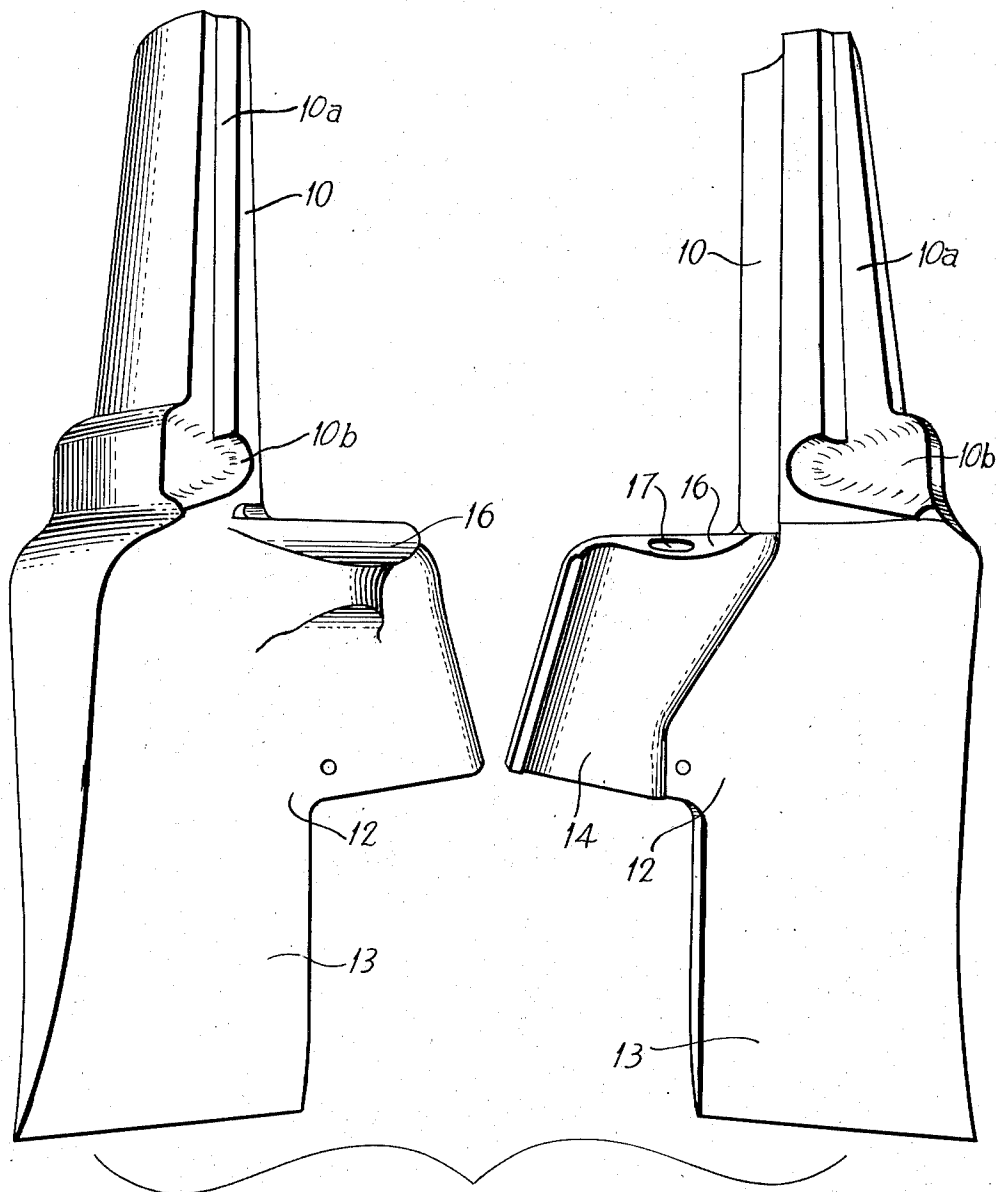


Fig 2

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5 Sheets-Sheet 3

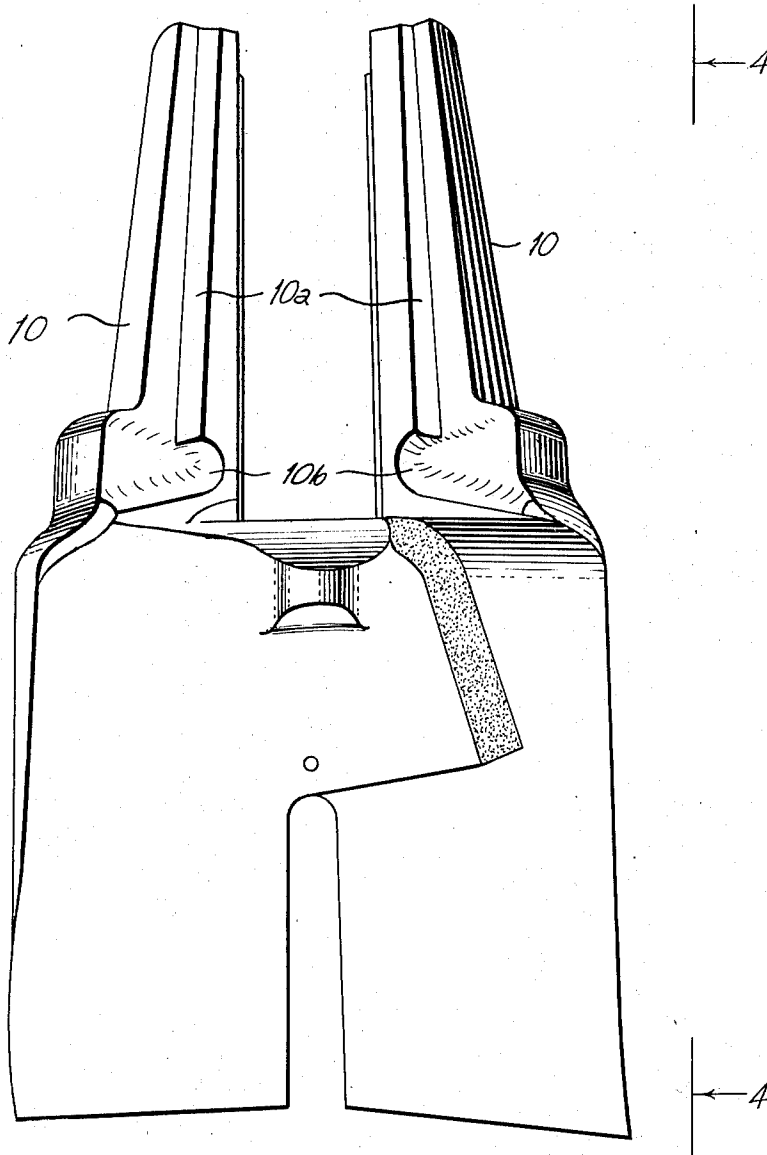


Fig 3

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5 Sheets-Sheet 4

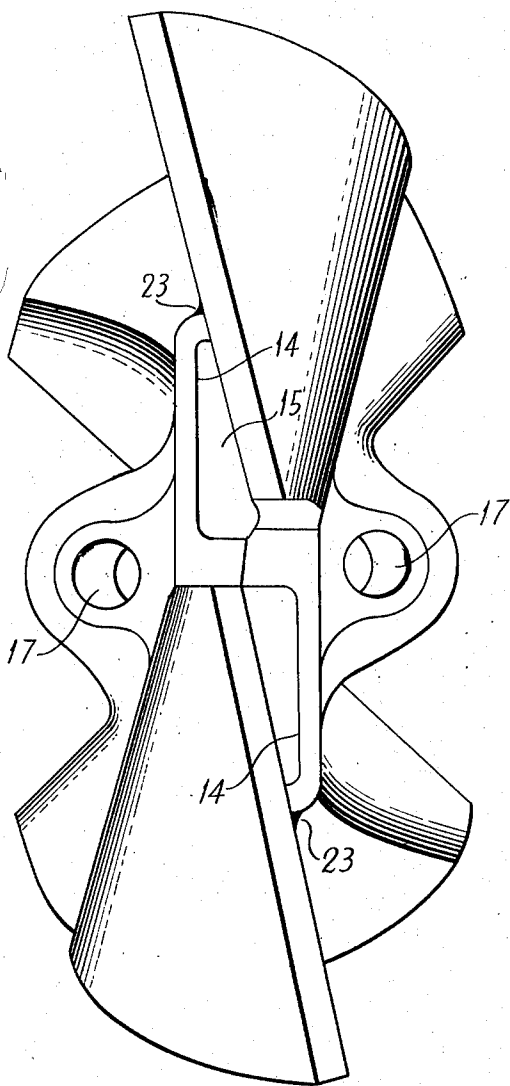


Fig 5

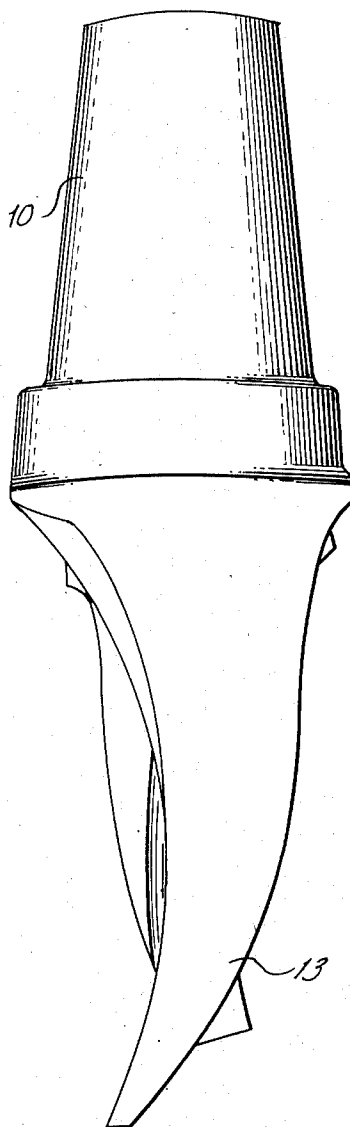


Fig 4 CHARLES C. GOOLSBEE

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Filed June 16, 1947

5 Sheets-Sheet 5

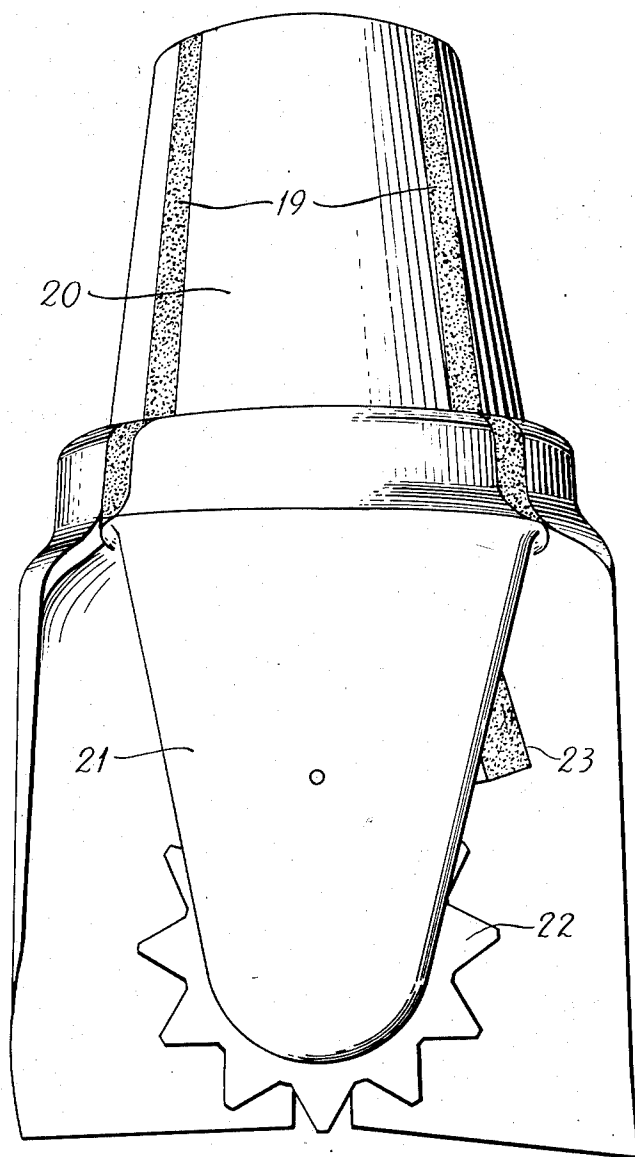


Fig 6

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2,614,810

ROTARY BIT

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Application June 16, 1947, Serial No. 754,922

7 Claims. (Cl. 255—61)

1

This invention relates to improvements in rotary bits and refers more particularly to a bit that may be economically fabricated, and the fabrication of which requires a minimum of machine work, the bit being made up of two pairs of segmental parts, one pair of which may be used either in drag-type bits or bits having in combination both drag and roller type cutters.

In the interest of economical fabrication of bits and parts thereof, it is desirable when possible to have a standardization of parts going into different types of bits. It is also desirable to use forgings or the like for the parts of the bits and to form the parts in such manner that on assembly into a bit a minimum of machine or other tool work is required.

An object of this invention is to provide a rugged bit made up of segments individually formed and requiring a minimum of machine or other special tool work.

Another object is to provide a rugged bit made up of segments individually formed and requiring a minimum of machine or other special tool work which, when made up has flush passages for drilling fluid formed therein without the requirement of drilling or other special tool work.

A further object is to provide a bit segment having an integral drag blade, the segment being useable alternatively in making up drag bits or bits with combination drag and roller cutters.

Another object is to provide a bit segment having an integral drag blade, the segment being useable alternatively in making up either drag bits or bits with combination drag and roller cutters, wherein on assembly flush passages for directing drilling fluid on the drag blades are formed without requirement of drilling or other special work.

Other and further objects of this invention will appear from the following description:

In the accompanying drawings which form a part of the instant specification and are to be read in conjunction therewith and wherein like reference numerals are employed to designate like parts in the various views;

Fig. 1 is a side-elevational view of a bit illustrating one embodiment of this invention;

Fig. 2 is a side-elevational exploded view of two bit segments having drag-type cutter blades and constituting component parts of the bit shown in Fig. 1;

Fig. 3 is a side-elevational view of the bit segments of Fig. 2 shown in assembled relation;

Fig. 4 is a view taken along the line 4—4 in Fig. 3 in the direction of the arrows;

Fig. 5 is a bottom plan view of the assembly shown in Figs. 3 and 4; and

2

Fig. 6 is a side-elevational view of a modified bit.

Referring to the drawings, it is believed that the invention can be more readily understood by first having reference to the Figs. 2 to 5 inclusive, illustrating one pair of the segmental parts which go into the construction, and form component parts of the assembled bits illustrated in Figs. 1 and 6. It should be borne in mind that the assembled bits of both figures of the drawings are made up of two pairs of bit segments, one pair of which may be used alternatively in making up either of the bits in Figs. 1 and 6. This pair of segments is shown in exploded position in Fig. 2 and illustrates the contour of both sides of the segment.

The bit segment has a portion 10 which makes up a part of the pin 11 of the assembled bit, and has another portion 12 which provides a drag-type cutter blade 13. The segment, of course, is one integral piece and preferably is a forging.

In order to provide a passage for directing drilling fluid over the blade cutters 13 in operation, each of the cutter segments are formed with a part which on assembly of the bit cooperates with a surface of the other segment of the pair to provide a pre-formed flow passage. This may be accomplished by providing a groove 14 in a portion of the segment. By reference to Fig. 5, it will be seen that the groove 14 on assembly of the bit cooperates with a surface of the other segment of the pair to form the passage 15 which communicates with the interior of the hollow bit pin. Thus, flush passages are provided for directing drilling fluid upon the blade cutters, which has been heretofore accomplished only by drilling holes in either the segment or bit body. This step has been eliminated, reducing the expense of fabrication to this extent.

In order that the bit segments, having the cutter blades may be used in a bit of the type having both drag blades and roller cutters, the segment is provided with a portion 16 which may be drilled to form a flow passage, as shown at 17. The passage at 17 serves to direct drilling fluid upon the roller cutters of the assembled bit and are not drilled unless the segments are to be employed in a bit having roller cutters.

The pair of bit segments, which are employed in conjunction with the pair of segments shown in Figs. 2 to 5, inclusive, on assembly of the bit provide the remainder of the pin, except for the welding material employed to join the bit segments together as is clearly shown in Fig. 1. In this figure of the drawings, the part 18 constitutes

3

one of the pair of segments and is welded to the segments of the other pair as shown at 19.

If a bit is to be made having roller cutters as well as blade cutters segments 20, as shown in Fig. 6, are employed in lieu of the segments 18. These segments have a portion forming a part of the bit pin. Another portion 21 integral therewith constitutes a roller cutter support adapted to receive a roller cutter 22. In this embodiment the roller cutter 22 is a side cutter.

To assemble the bits the two pairs of forgings are placed together in a jig in proper relationship and are secured in this position by welding at 19 and also at 23. The pin portions 10 of the blade carrying segments are formed along their edges with grooves 10a and cut-a-way portions 10b to receive the welding material shown at 19, thus securing a bond between the segments 10 and 18 or 20 as the case may be. Once the segments have been secured together, suitable threads are ground upon the outer periphery of the pin portions of the assembled bit and the bit is then ready for use in the conventional manner.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

Having described my invention, I claim:

1. A rotary drill bit comprising two pairs of segments joined together and providing a bit with a hollow pin portion and cutters, the individual segments of each pair being substantially identical and being arcuately shaped with their longitudinal edges abutting to form a hollow pin, each of the segments of one pair having a portion making up a part of the pin of the bit and another portion providing a drag-type bit blade providing a cutter, one of the segments of said pair also including a lateral extension having a concavity therein and an outer edge lateral extension, on assembly of the bit, overlies and cooperates with the surface of the other segment of said pair with said outer edge abutting the blade surface of said other segment to define an enclosed passage communicating with the interior of the hollow pin for directing drilling fluid upon the blade of said last segment, the individual segments of the other pair providing substantially the remainder of the pin.

2. A rotary drill bit comprising two pairs of segments joined together and providing a bit with a hollow pin portion and cutters, the individual segments of each pair being substantially identical and being arcuately shaped with their longitudinal edges abutting to form the hollow pin, each of the segments of one pair having a portion making up a part of the pin of the bit and another portion providing a drag-type bit blade providing a cutter, one of the segments of said pair also including a substantially flat lateral extension having a concavity therein and an outer edge which, on assembly of the bit, overlies and cooperates with a surface of the other segment of said pair with said outer edge abutting the blade surface of said other segment to define an enclosed passage communicating with the interior of the hollow pin for directing drilling fluid upon one of the blades of said bit, the individual segments of the other pair providing substan-

4

tially the remainder of the pin, and having a portion providing a support for a roller cutter, the cutter blade segments having a drillable portion for providing a drilling fluid passage communicating with the interior of the pin.

3. As a subcombination, a bit segment adapted to be made up into and provide a component part of a drag-type bit and combination drag and roller cutter bit, comprising an upper portion arcuate in cross-section and adapted to constitute a part of a bit pin, a cutter blade element formed at the lower portion of the segment, a substantially flat extension on the exterior surface of the segment below the arcuate upper portion thereof, said extension having a concavity therein and an outer edge, whereby said extension is adapted to overlie and cooperate with the surface of another identical segment with said outer edge abutting the blade surface of said other segment, on assembly, into a bit, to provide an enclosed flush passage for directing drilling fluid upon a cutter blade of a bit so formed, said cutter blade portion having an enlargement on and extending from the extension which has a flush passage therein for directing drilling fluid upon a roller cutter on assembly of the segment as a part of a combination drag and side cutter bit.

4. A rotary drill bit comprising, a pair of segments of identical construction, each segment having its upper portion generally arcuate in transverse section and forming a part of the connecting pin of the completed bit and having its lower portion formed as a drag-type bit blade to provide a cutter, each segment also having an inwardly extending lateral extension which is disposed between the arcuate upper portion and the drag-type blade portion, with each of said lateral extensions having a concavity therein and an outer edge, each extension being adapted to overlie the blade surface of the other segment with the outer edge abutting said blade surface of the other segment when the segments are fitted together whereby the concavity of each lateral extension and the blade surface which it overlies form a fluid passage therebetween, a pair of segmental sections arcuate in cross-section and adapted to be positioned between the arcuate upper portions of the segments and contacting therewith to complete the annular connecting pin of the bit, and means for connecting the segments and segmental sections to each other.

5. A rotary drill bit comprising, a pair of segments of identical construction, each segment having its upper portion generally arcuate in transverse section and forming a part of the connecting pin of the completed bit and having its lower portion formed as a drag-type bit blade to provide a cutter, each segment also having a lateral extension which is directed inwardly along a plane which is parallel to a plane transversely of the bit and which is disposed between the arcuate upper portion and the drag-type blade portion, each lateral extension of one segment having a groove which is adapted to overlie the lateral extension of the other segment and also being arranged to extend in overlapping relation to the surface of the blade portion of the other segment, the longitudinal edge portion of each extension engaging the surface of the blade portion which it overlies, whereby said lateral extensions provide a reinforcement of the segments and a fluid passage between each lateral extension and the blade surface of the

other segment when said segments are fitted together, a pair of segmental sections arcuate in cross-section and adapted to be positioned between the arcuate upper portions of the segments and co-acting therewith to complete the cylindrical connecting pin of the bit, and means for connecting the segments and segmental sections to each other.

6. A rotary drill bit as set forth in claim 4, together with a downwardly directed longitudinal extension of each of the segmental sections, and a roller cutter supported in said extension.

7. A rotary drill bit as set forth in claim 5, together with an enlargement on the outer surface of each lateral extension having a fluid passage therein, a longitudinal extension on each segmental section projecting downwardly therefrom, and a roller cutter on each longitudinal extension with said roller cutters being disposed below the fluid passages in the enlargements on said lateral extensions whereby flow through said passages is directed onto said cutters.

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