level of the lowest parts of the nozzles 8 are just above the level of the root of the heel teeth at the gauge side. Further, the lowest parts of the nozzles 8 should not be more than 1 inch above the level of the root of the heel teeth at the gauge side so as not to weaken unduly the effect of the jets on the bottom of the hole being drilled. The lowest part of the nozzles 8 may either be formed by the lowest part of the tubular members or by the lowest part of the nozzles 10, provided that these nozzles 10 extend beyond the tubular elements.

The invention is also applicable to bits provided with jet nozzles having discharge openings, the axes of which are not normal to the hole bottom as indicated in FIG. 1. Thus, the axis of a tubular member and/or of a nozzle 10 and the central axis of the drilling bit do not need to be in a common plane. Such slanted arrangement of the nozzles 8 will combat bit balling of the cutting elements 7.

It will be understood that the present invention is not limited to the particular examples which have been described with reference to the drawings, since many modifications therein may be made. It is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

I claim as my invention:

1. A rotary drilling bit for drilling wells of the type employed in petroleum exploration and production which comprises:

(a) a bit body having a fluid cavity therein;

(b) a plurality of leg members porjecting downwardly from the bit body and spaced around a central axis of said bit body;

(c) a bearing member mounted on each of the leg members and having the axis thereof directed downwardly toward the central axis of the bit body;

(d) a conical element rotatably carried by each of the bearing members whereby the bases of said conical elements cooperatively determine the gage of the well bore, each of said conical elements having a conical root surface from which a plurality of earth engaging elements project;

(e) conduit means carried by the bit body in communication with the fluid cavity and extending downwardly substantially between the bases of adjacent conical elements below said bit body to a level of substantially one inch above the lowermost level of said root surface;

(f) nozzles attached to the conduit means at the lower ends thereof (and positioned between adjacent cutting elements); and

(g) substantially hard-facing wear-resisting protective cover means disposed on at least a portion of the outer surfaces of the nozzles exterior of the central axis of the bit body forming a protective cover for each said conduit means.

2. A three-cone rotary drilling bit for drilling wells of the type employed in petroleum exploration and production which comprises:

(a) a bit body having a fluid cavity therein;

(b) three leg members projecting downwardly from the bit body and spaced around a central axis of said bit body at uniform intervals;

(c) a bearing member mounted on each of the leg members and having the axis thereof directed downwardly toward the central axis of the bit body;

(d) a conical element rotatably carried by each of the bearing members whereby the bases of said conical elements cooperatively determine the gage of the well bore, each of said conical elements having a conical root surface from which a plurality of earth engaging elements project;

(e) conduit means carried by the bit body in communication with the fluid cavity and extending downwardly substantially between the bases of each two adjacent conical elements below said bit body to a level of substantially one inch above the lowermost level of said root surface;

(f) nozzles attached to the conduit means at the lower ends thereof (and positioned between each two adjacent cutting elements); and

(g) substantially hard-facing wear-resisting protective cover means disposed on at least a portion of the outer surfaces of the nozzles exterior of the central axis of the bit body forming a protective cover for each of said conduit means.

3. A drilling bit as defined by claim 2 wherein said conduit means and protective cover means are separate elements.

4. A drilling bit as defined by claim 3 wherein said conduit means are tubes.

5. A drilling bit as defined by claim 4 wherein said protective cover means are elements having a U-shaped cross-section which partially encircles the upper portions of the tubes, the open portions of the cover elements being toward the central axis of the bit.

6. A drilling bit as defined by claim 4 wherein said protective cover means comprises:

(a) U-shaped elements which partially encircle the upper portions of the tubes, the open portions of the U-shaped elements being toward the central axis of the bit; and

(b) wear-resistant material bonded to the outer surfaces of said U-shaped elements.

7. A drilling bit as defined by claim 2 wherein said conduit means and protective cover means comprise:

(a) body members having fluid channels therethrough, and wear-resistant material bonded to the outer surfaces of said body members which face the conical elements.

8. Apparatus as described by claim 2 wherein the outer radial extremity of said protective cover with respect to the bit axis is substantially within 1/16 and 1/8 inch less than the gage radius of said well bore.

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