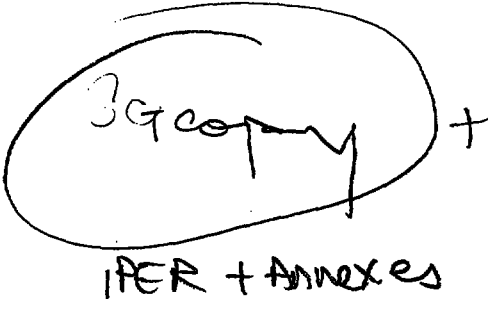


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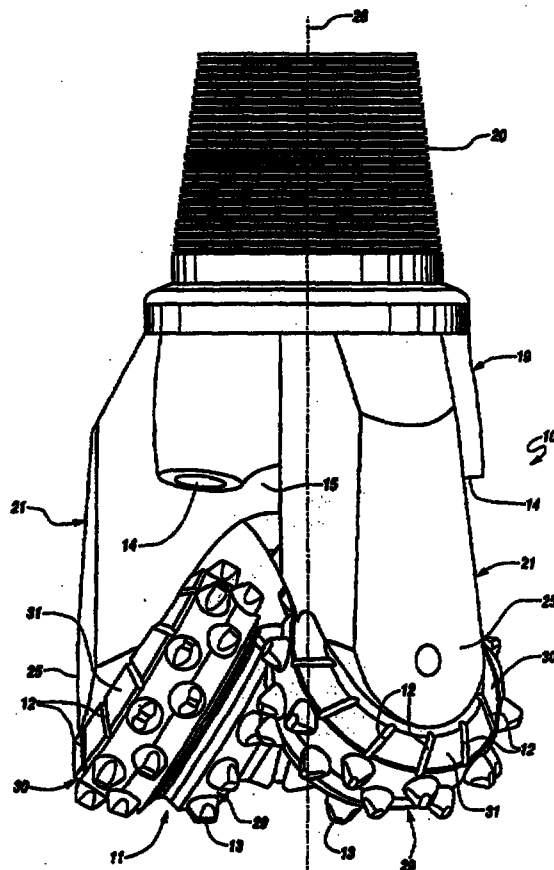
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6: E21B 10/00	A1	(11) International Publication Number: WO 95/27120
		(43) International Publication Date: 12 October 1995 (12.10.95)
(21) International Application Number: PCT/US95/03994		(82) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TM, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).
(22) International Filing Date: 31 March 1995 (31.03.95)		Published With international search report. 
(30) Priority Data: 08/221,841 31 March 1994 (31.03.94) US		
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(54) Title: **ROTARY DRILL BIT WITH IMPROVED CUTTER AND SEAL PROTECTION**

(57) Abstract

A rotary cone bit (10) for forming a borehole having a body with an underside (15) and an upper portion adapted (20) for connection to a drill string. The drill bit (10) rotates around a central axis (26) of the body. A number of angularly-spaced arms (21) are integrally formed with the body and depend therefrom. Each arm (21) has an inside surface (24) with a spindle (23) connected thereto and an outer shirrtail surface (25). Each spindle (23) projects generally downwardly and inwardly with respect to the central axis (26), has a generally cylindrical upper end portion connected to the inside surface (24), and has an inner sealing surface within the upper end portion. A number of rotary cone cutters (11) equal to the number of arms (21) are each mounted on one of the spindles (23). Each of the cutters (11) includes an internal generally cylindrical wall defining a cavity (36) for receiving the spindle (23), a gap (41) with a generally cylindrical first portion defined between the spindle (23) and cavity wall, an outer sealing surface in the cavity wall concentric with the inner sealing surface, and a seal element (43) spanning the gap (41) and sealing between the inner and outer sealing surfaces.



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