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(54) **SEAL ARRANGEMENT WITH IMPROVED SHAFT BUSHING FOR A ROTATING SHIP PROPELLER SHAFT**

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F16J 15/00 (2006.01)

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CPC ***F16J 15/32*** (2013.01); ***B63H 23/321*** (2013.01); ***F16J 15/002*** (2013.01); ***F16J 15/3256*** (2013.01); *B63B 2231/06* (2013.01); *B63B 2231/14* (2013.01); *B63H 2023/327* (2013.01)

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,207,521	A	*	9/1965	Dega	277/568
3,214,180	A	*	10/1965	Hudson et al.	277/571
3,773,336	A	*	11/1973	Walter et al.	277/551
3,788,100	A	*	1/1974	Pitner	464/11
3,902,726	A	*	9/1975	Hisada	277/563
3,920,250	A	*	11/1975	Eklund	277/555
4,781,102	A	*	11/1988	Scerbo et al.	91/41
5,082,294	A	*	1/1992	Toth et al.	277/551
5,219,434	A		6/1993	Von Bergen et al.	
5,308,269	A		5/1994	von Bergen et al.	
5,643,026	A		7/1997	Pietsch et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

DE	1 183 399	12/1964
DE	71 19 832 U	11/1971
DE	25 17 913	11/1976
DE	28 39 816	3/1980
DE	33 27 421	2/1985
DE	37 42 079	6/1989

(Continued)

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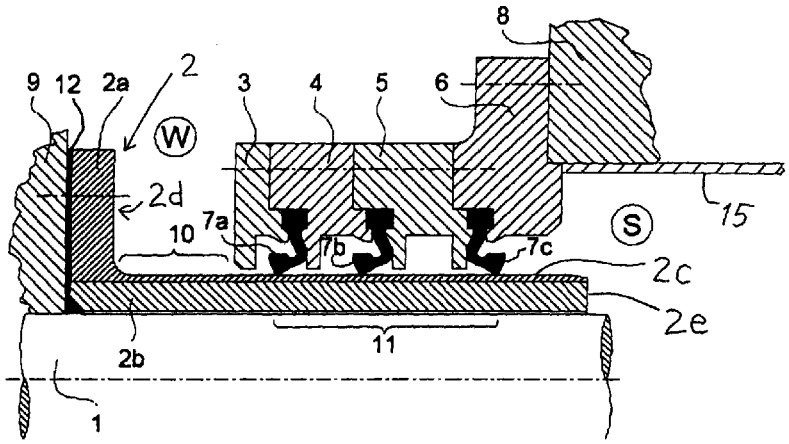
(57) **ABSTRACT**

A seal arrangement for sealing a propeller shaft where it penetrates through the hull of a watercraft includes a shaft bushing around this portion of the shaft, one or more seal rings forming a seal around the shaft bushing, and a stationary support holding the seal ring or rings. The shaft bushing includes an outer bushing part made of a wear-resistant material, arranged coaxially around an inner bushing part made of a material having a high thermal conductivity. The thickness of the outer part relative to the thickness of the inner part is a ratio in a range from 1:10 to 1:3. The two-part shaft bushing can provide optimized thermal conductivity and heat dissipation away from the seal rings to the cool exterior water environment, as well as optimized wear-resistance, corrosion resistance and reduced friction for the seal rings.

21 Claims, 1 Drawing Sheet