



(12) **United States Patent**  
**Renshaw**

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(54) **SOLENOID-OPERATED VALVE**  
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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**  
A solenoid-operated valve of the kind that is used in a subsea control pod comprises a valve assembly (2) and a solenoid assembly (1). The valve assembly (2) comprising has fluid ports (P, S, T) for the receipt and delivery of hydraulic control fluid and a valve element (37, 38, 39) that is actuatable between open and closed positions in order to control the flow of hydraulic control fluid between the fluid ports. The valve element (37, 38, 39) is actuatable by an actuating member of the solenoid assembly (1). The solenoid chamber (A) is filled with oil and sealed against ingress of hydraulic control fluid from the valve chamber (36) and from the ingress of oil and/or seawater from the control pod. A movable pressure balancing device (30) is provided in the solenoid assembly (1) so as to ensure that the internal pressure of the oil in the solenoid chamber (A) and the external pressure of the oil in the control pod are balanced.

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See application file for complete search history.

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