

[54] PNEUMATICALLY POWERED PUMP

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[58] Field of Search ..... 417/394, 478, 389, 383; 92/90, 93, 92

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[57] ABSTRACT

A down hole pump (10) placed in a well bore for pumping liquid comprises a pump body (12) with a longitudi-

nal axis adapted to be placed in the well bore and submerged in the liquid. A gas pressure conduit (28) is connected between the pump body (12) and the well surface for supplying pressurized gas to the pump body (12). An exhaust conduit (30) is connected to the pump body (12) for conducting the liquid to the well surface. A one-way valve (54) is disposed in the pump body (12) and is connected to the exhaust conduit (30). An elastic diaphragm (40) is located in the pump body (12) and is movable in response to a pressure differential between the diaphragm (40) and the pump body (12) for displacing liquid from the diaphragm (40) when the pressure in the pump body (12) is greater than that in the diaphragm (40) and for expanding with the liquid when the pressure in the pump body (12) is lower than that in the diaphragm (40). A perforated, hollow limit tube (50) is disposed about the longitudinal axis and conducts the liquid within the diaphragm (40) to the exhaust conduit (30). A piston (44) is slidably disposed in the pump body (12) and is attached to the diaphragm (40). A spring (58) is secured to the piston (44) and the pump body (12) for expanding the diaphragm from its collapsed position to its expanded position. A second one-way valve (56) is connected to the piston (44) and provides fluid communication between the diaphragm (40) and the well bore.

12 Claims, 4 Drawing Figures

