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(57) Abstract :

ABSTRACT A SYSTEM AND A METHOD TO ENABLE SPILL-PROOF, CONTROLLED, AND SAFE TRANSFER OF FUEL USING A MULTI-STAGE MEMBRANE ACTIVATION AND ADAPTIVE SEALING MECHANISM FOR TWO-WHEELER REFUELING The present disclosure relates to a system and method that makes it possible to safely, controlled, and spill-proof transfer of liquid fuel into a fuel tank, especially for two-wheeled vehicles. The system has a fuel container body that is part of a multi-stage adaptive membrane assembly. This assembly has a vapor barrier layer, a pressure-responsive rupture layer, and a micro-valve flow regulation layer that only lets fuel out when a certain pressure threshold is reached. An adaptive sealing collar makes an airtight connection with the fuel tank inlet. A safety interlock mechanism makes sure that the collar can only be activated under certain insertion and pressure conditions. The system also has a micro-channel flow regulation module to keep the dispensing laminar and a vapor containment module to cut down on evaporation losses. In more advanced versions, sensors and a processor are set up to keep an eye on pressure levels, find leaks, and control the flow of fuel. This makes fuel transfer operations safer, more efficient, and better for the environment.

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