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(54) Title: APPARATUS FOR PARTICLE REMOVAL BY SINGLE-PHASE AND TWO-PHASE MEDIA

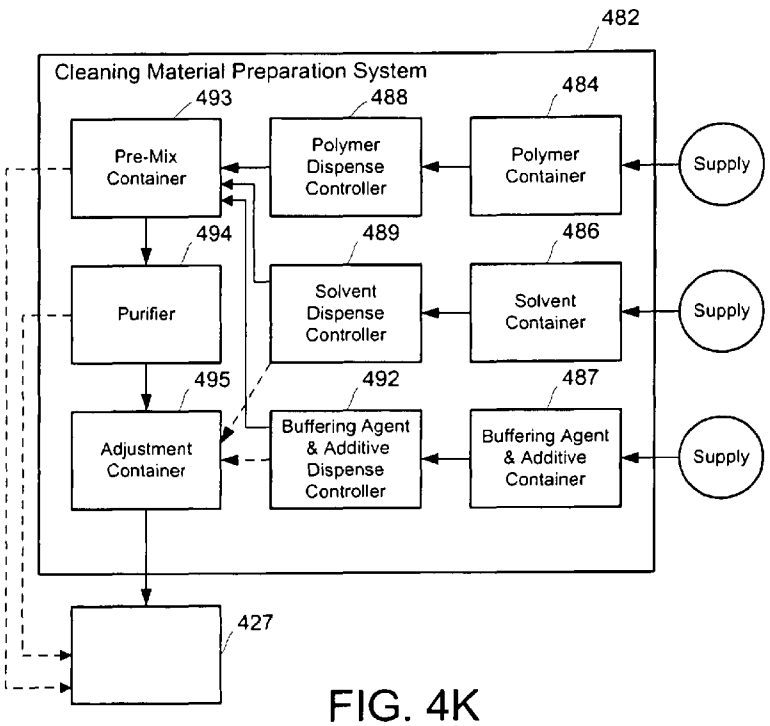



FIG. 4K

(57) Abstract: The embodiments of the present invention provide apparatus for cleaning patterned substrates with fine features with cleaning materials. The apparatus using the cleaning materials has advantages in cleaning patterned substrates with fine features without substantially damaging the features. The cleaning materials are fluid, either in liquid phase, or in liquid/gas phase, and deform around device features; therefore, the cleaning materials do not substantially damage the device features or reduce damage all together. The cleaning materials containing polymers of a polymeric compound with large molecular weight capture the contaminants on the substrate. In addition, the cleaning materials entrap the contaminants and do not return the contaminants to the substrate surface. The polymers of one or more polymeric compounds with large molecular weight form long polymer chains, which can also be cross-linked to form a network (or polymeric network). The long polymer chains and/or polymer network show superior capabilities of capturing and entrapping contaminants, in comparison to conventional cleaning materials.

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