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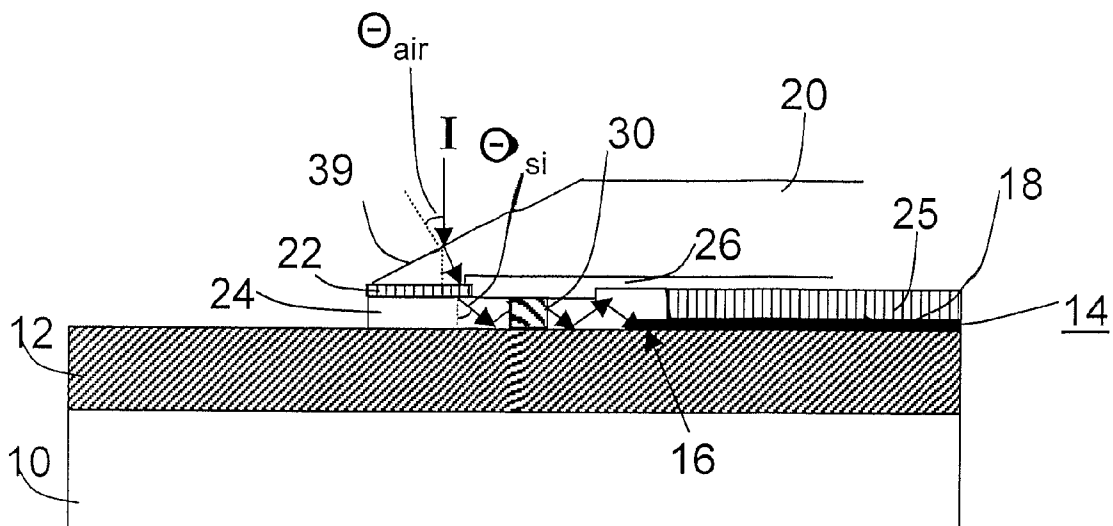
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(54) Title: SILICON NANOTAPER COUPLERS AND MODE-MATCHING DEVICES



(57) Abstract: An optical coupling arrangement including an ultrathin silicon waveguide (18) formed in an upper silicon layer (14) of a silicon-on-insulator (SOI) structure and a silicon nanotaper structure (16) formed in the upper silicon layer and coupled to the ultrathin silicon waveguide. A dielectric waveguide coupling layer (24), with a refractive index greater than that of the dielectric insulating layer but less than that of silicon, overlies a portion of the dielectric insulating layer (12) where an associated portion of the SOI layer has been removed. An end portion of the dielectric waveguide coupling layer overlaps an end section of the silicon nanotaper to form a mode conversion region (26). A free-space optical coupling arrangement (such as a prism (24) or grating) is disposed over the dielectric waveguide coupling layer and used to couple a propagating free space signal to the dielectric waveguide coupling layer and thereafter into the ultrathin silicon waveguide.

WO 2005/077110 A3



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