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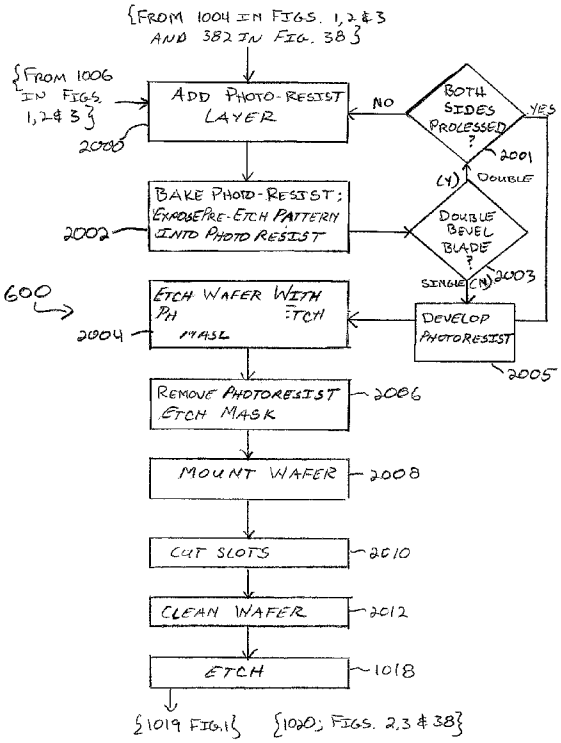
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(54) Title: METHODS OF FABRICATING COMPLEX BLADE GEOMETRIES FROM SILICON WAFERS AND STRENGTHENING BLADE GEOMETRIES



(57) Abstract: Ophthalmic surgical blades are manufactured from either a single crystal or poly-crystalline material, preferably in the form of a wafer. The method comprises preparing the single crystal or poly-crystalline wafers by mounting them and etching trenches into the wafers using one of several processes. Methods for machining the trenches, which form the bevel blade surfaces, include a diamond blade saw, laser system, ultrasonic machine, a hot forge press and a router. Other processes include wet etching (isotropic and anisotropic) and dry etching (isotropic and anisotropic, including reactive ion etching), and combinations of these etching steps. The wafers are then placed in an etchant solution which isotropically etches the wafers in a uniform manner, such that layers of crystalline or poly-crystalline material are removed uniformly, producing single, double or multiple bevel blades. Nearly any angle can be machined into the wafer, and the machined angle remains after etching. The resulting radii of the blade edges is 5-500 nm, which is the same caliber as a diamond edged blade, but manufactured at a fraction of the cost. A range of radii may be 30 to 60 nm, with a specific implementation being about 40 nm. The blade profile may have an angle of, for example, about 60 . The ophthalmic surgical blades can be used for cataract and refractive surgical procedures, as well as microsurgical, biological and non-medical, non-biological purposes. Surgical and non-surgical blades and mechanical devices manufactured as described herein can also exhibit substantially smoother surfaces than metal blades.

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