

**OPTICAL GAP MEASURING APPARATUS AND METHOD
ABSTRACT OF THE DISCLOSURE**

Optical method and means for high-speed measurement of the distance between two surfaces, the first of which (25, 25a) is part of a substantially transparent element (20, 20a) and the second of which (35, 35a) is part of a test object (30, 30a). In a first step, a lens (3) directs a light beam (2) through a polarizing component (4) towards the first surface at an oblique angle of incidence. The measurement beam may be positioned on the surface under test (35, 35a) with an in-line optical system or a normal incidence one. In a next step, the polarized light beam (5) reflects back through the transparent element by means of the combined effect of reflections from the first surface of the transparent element and from the surface of the test object (30). In a further step, a polarization-sensitive intensity detector (12) and a phase detector (13) measure the strength and relative phase of the polarization components defined by the plane of incidence. A computer (99) then analyzes these measured parameters to determine the size of the gap between the two surfaces (25,35). An additional method and means are provided to measure the complex index of refraction of the object surface (35) by changing the gap between the surfaces (25,35).

FIGURE 1