



- [54] INTEGRATED OPTICAL SENSOR
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- [73] Assignee: EG&G Idaho, Inc., Idaho Falls, Id.
- [21] Appl. No.: 960,329
- [22] Filed: Oct. 13, 1992
- [51] Int. Cl.⁵ B23K 9/12; G06F 15/46
- [52] U.S. Cl. 228/102; 228/9; 219/124.34; 219/130.01
- [58] Field of Search 228/102, 105, 7-9; 29/407, 702, 709; 219/124.34, 130.01; 250/559

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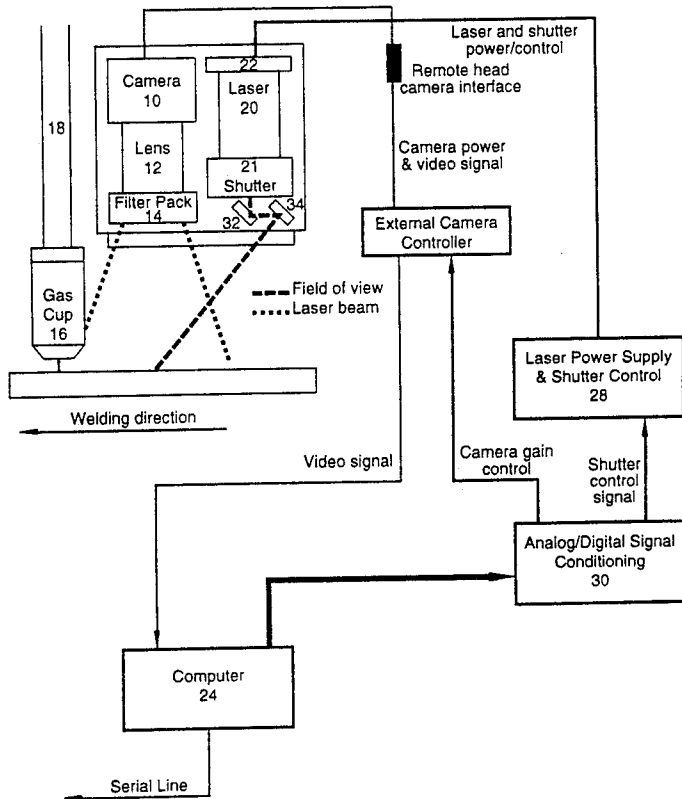
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[57] **ABSTRACT**

An integrated optical sensor for arc welding having multifunction feedback control. The sensor, comprising generally a CCD camera and diode laser, is positioned behind the arc torch for measuring weld pool position and width, standoff distance, and post-weld centerline cooling rate. Computer process information from this sensor is passed to a controlling computer for use in feedback control loops to aid in the control of the welding process. Weld pool position and width are used in a feedback loop, by the weld controller, to track the weld pool relative to the weld joint. Sensor standoff distance is used in a feedback loop to control the contact tip to base metal distance during the welding process. Cooling rate information is used to determine the final metallurgical state of the weld bead and heat affected zone, thereby controlling post-weld mechanical properties.

21 Claims, 6 Drawing Sheets



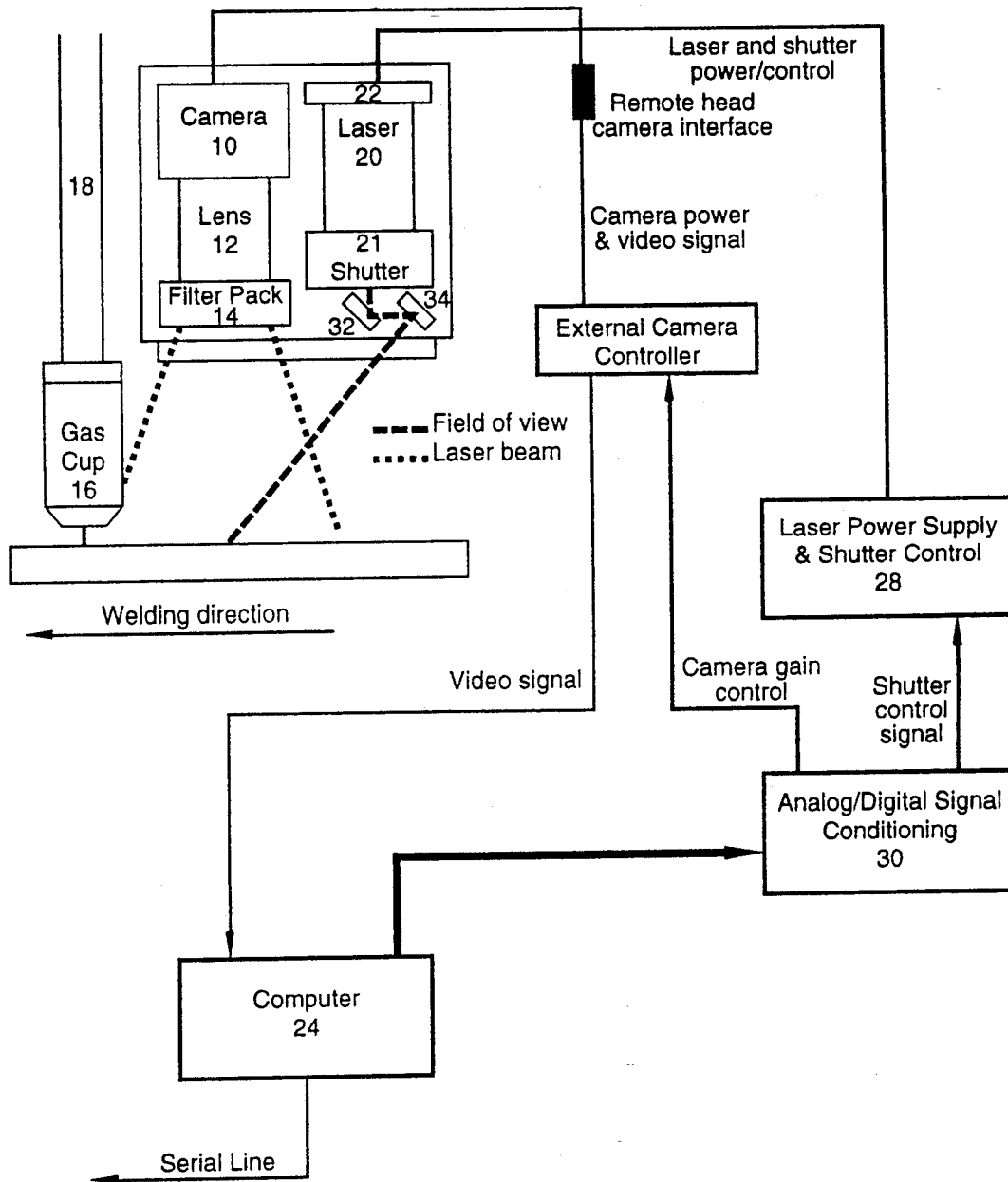


Fig.1

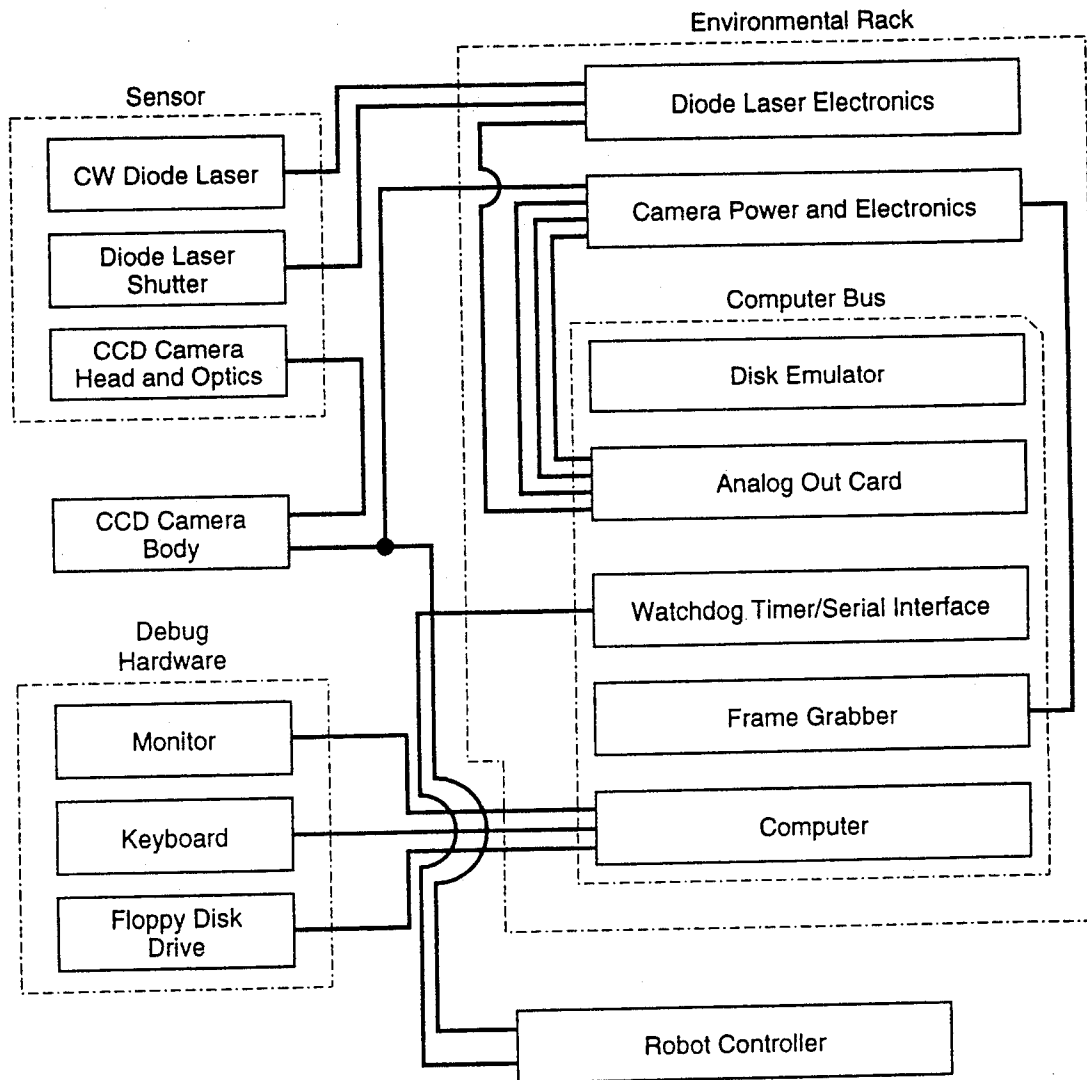


Fig.2

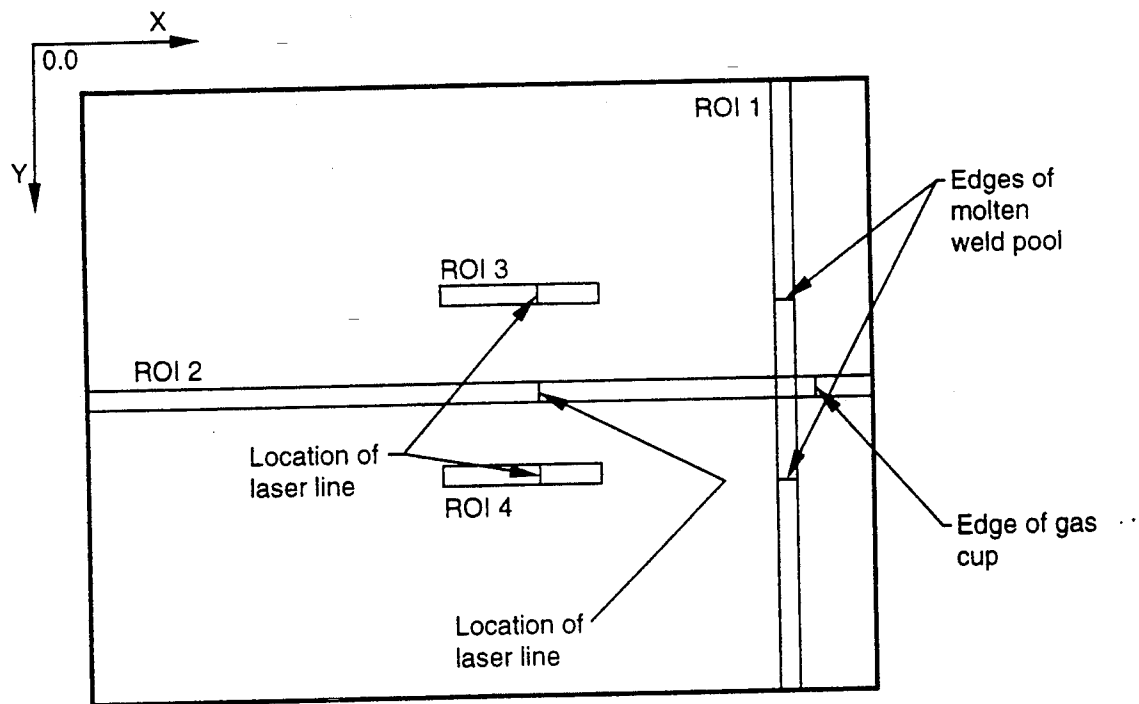


Fig. 4b.

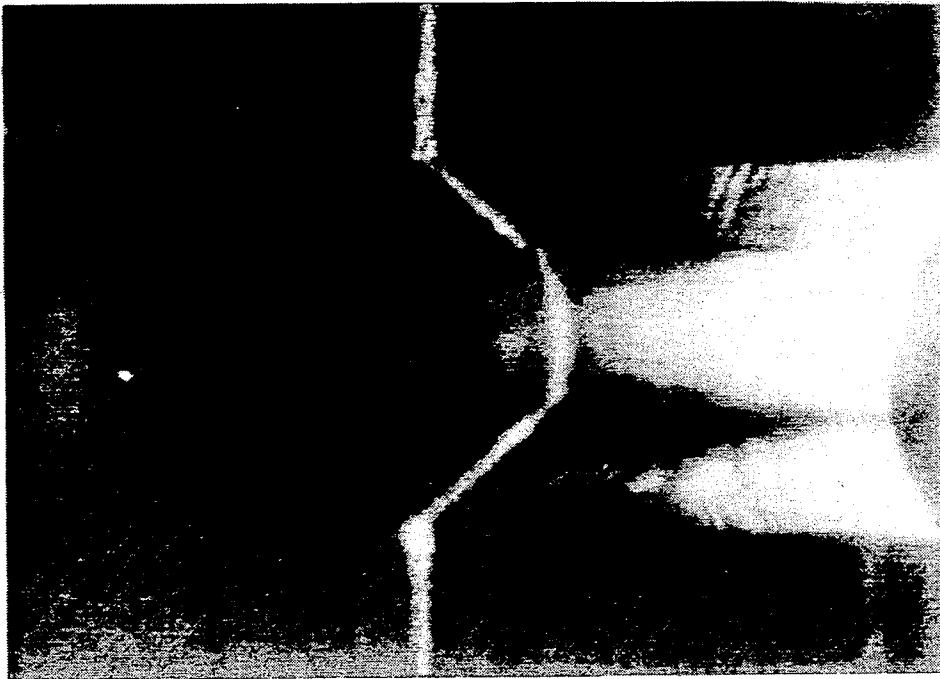


Fig. 3a.

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