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Stettner et al.

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[54] **3D IMAGING UNDERWATER LASER RADAR**

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Related U.S. Application Data

[60] Division of Ser. No. 15,627, Feb. 9, 1993, Pat. No. 5,446, 529, which is a continuation-in-part of Ser. No. 856,019, Mar. 23, 1992, Pat. No. 5,475,225.

[51] Int. Cl.⁶ **G01C 3/08**

[52] U.S. Cl. **356/4.01; 250/332**

[58] Field of Search **250/332, 330,**
250/339; 356/5.01, 4.01

[56] References Cited

U.S. PATENT DOCUMENTS

4,652,766	3/1987	Wang et al.	250/578
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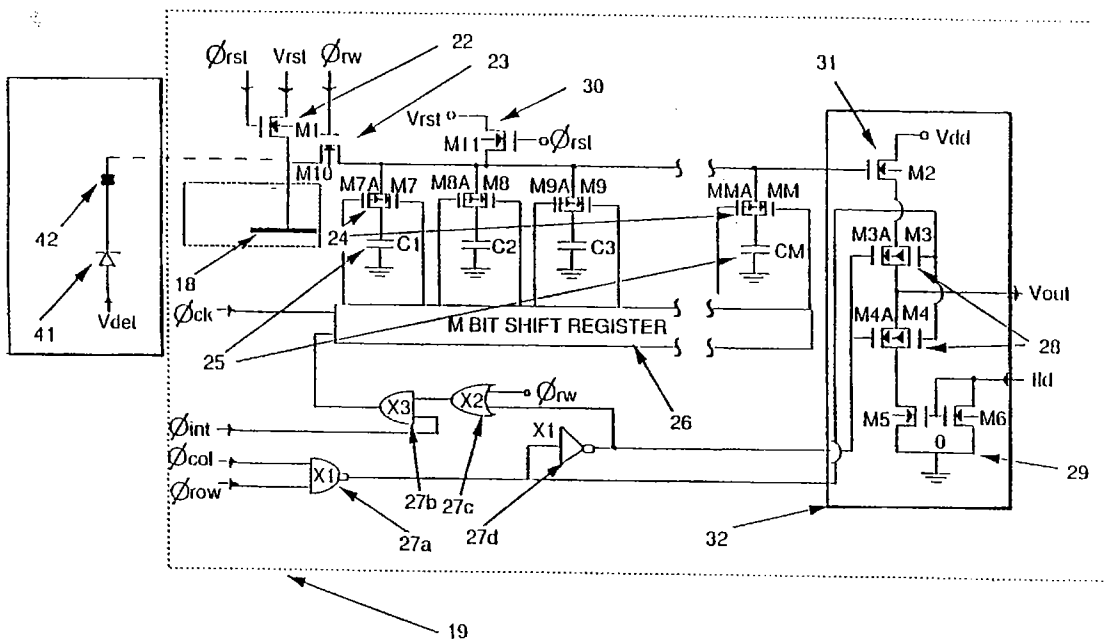
Primary Examiner—Mark Hellner

17 Claims, 11 Drawing Sheets

Attorney, Agent, or Firm—Gottlieb, Rackman & Reisman, P.C.

[57] ABSTRACT

A three dimensional imaging device and method is presented which uses a pulsed light source for detecting objects enveloped by a light-transmitting and light-reflecting and scattering medium such as water or biological tissues. By means of high-speed switching between many storage capacitors the third dimension is recorded by the device with a single pulse from the light-source. The device consists of the pulsed light source, optics for collecting the reflected and scattered light, one or more sensors for detecting the light, drive and output electronics for timing and signal conditioning of data generated by the sensors and processing electronics and software for converting the sensor data to a three dimensional image. The sensors use known technologies for light amplification but collect and process the light-amplified data in a unique manner, using an analog-processing readout chip. The readout chip is a two dimensional array of collectors or detectors combined in very close proximity with associated storage and switching electronics. The two dimensional array defines two dimensions of the image. The third dimension is associated with the time of return of the light pulse.



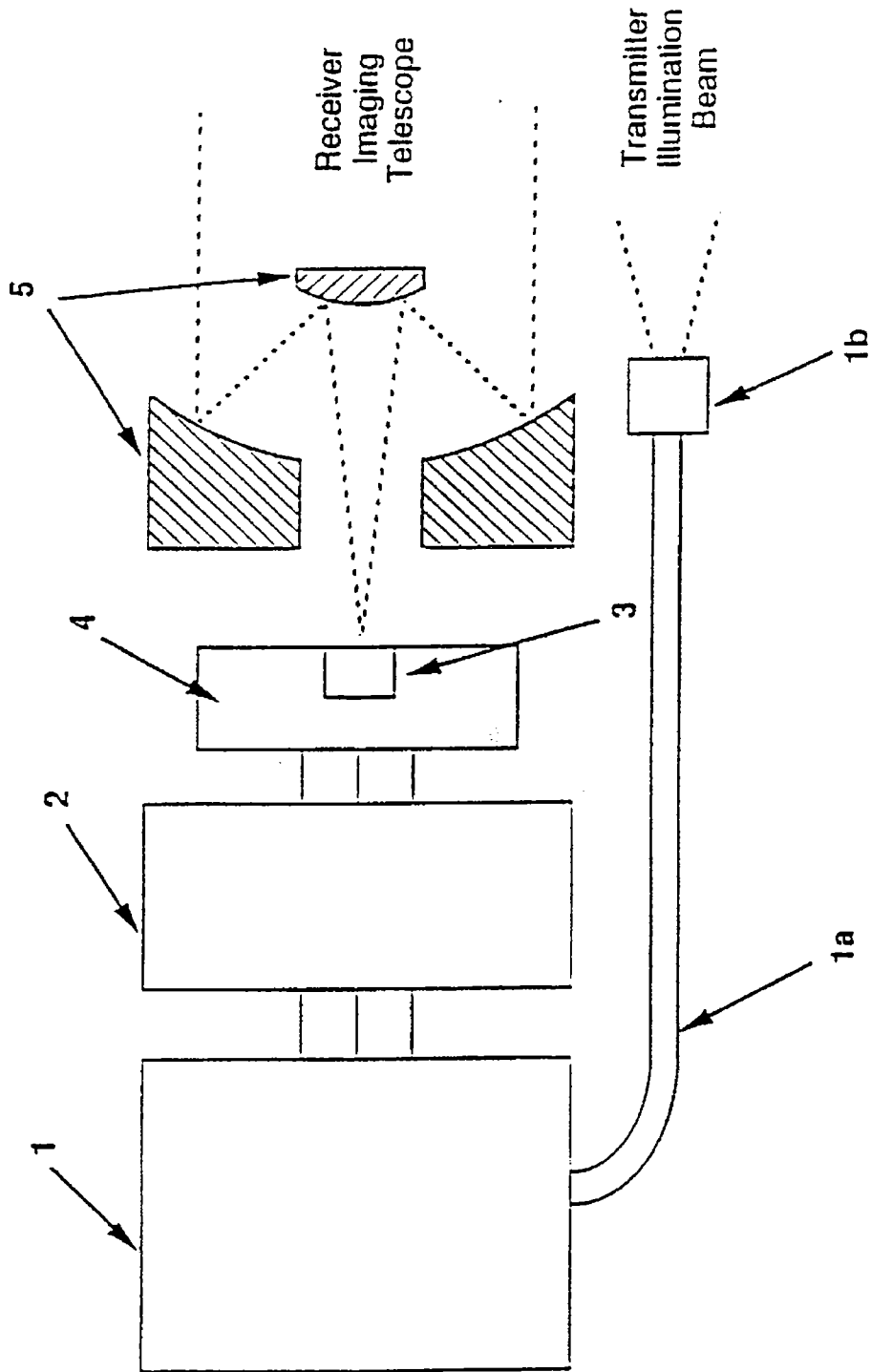


FIG. 1

FIG. 2

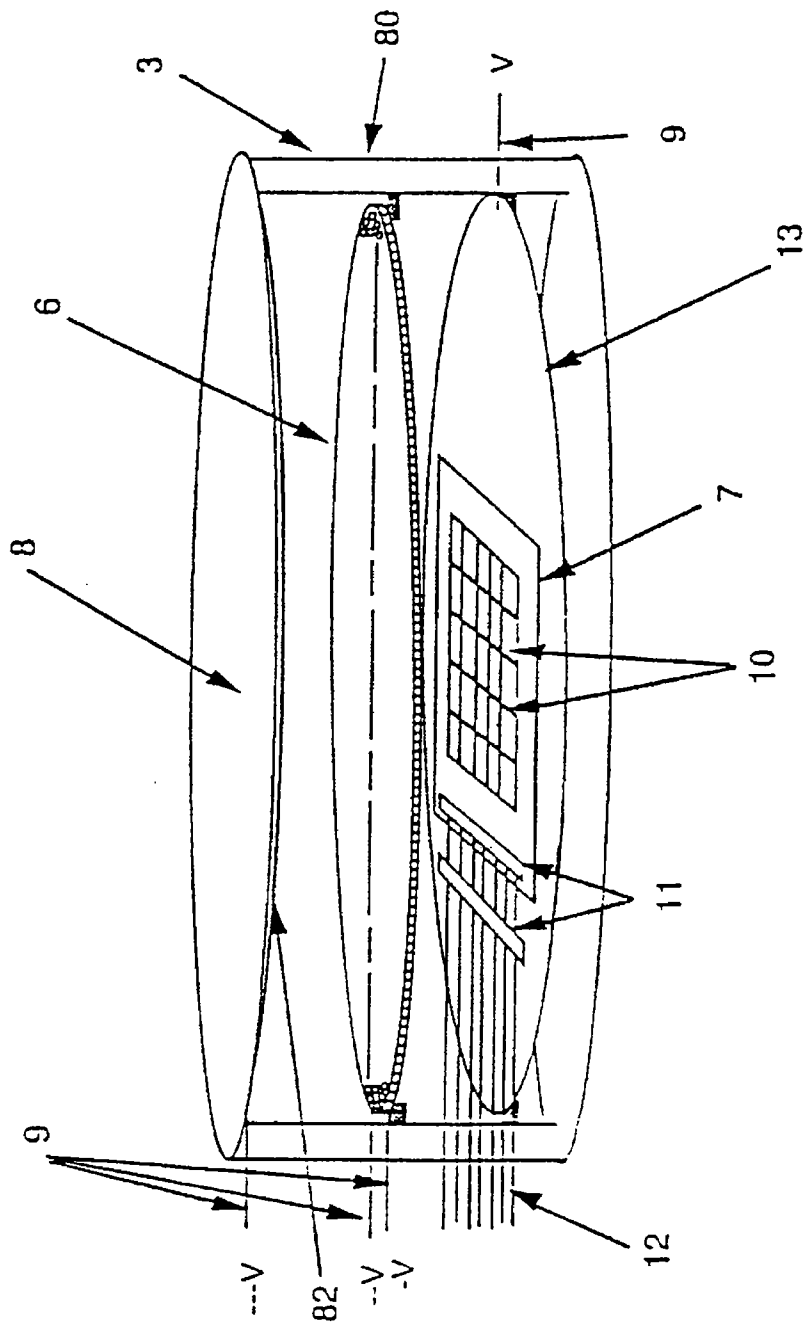


FIG. 3

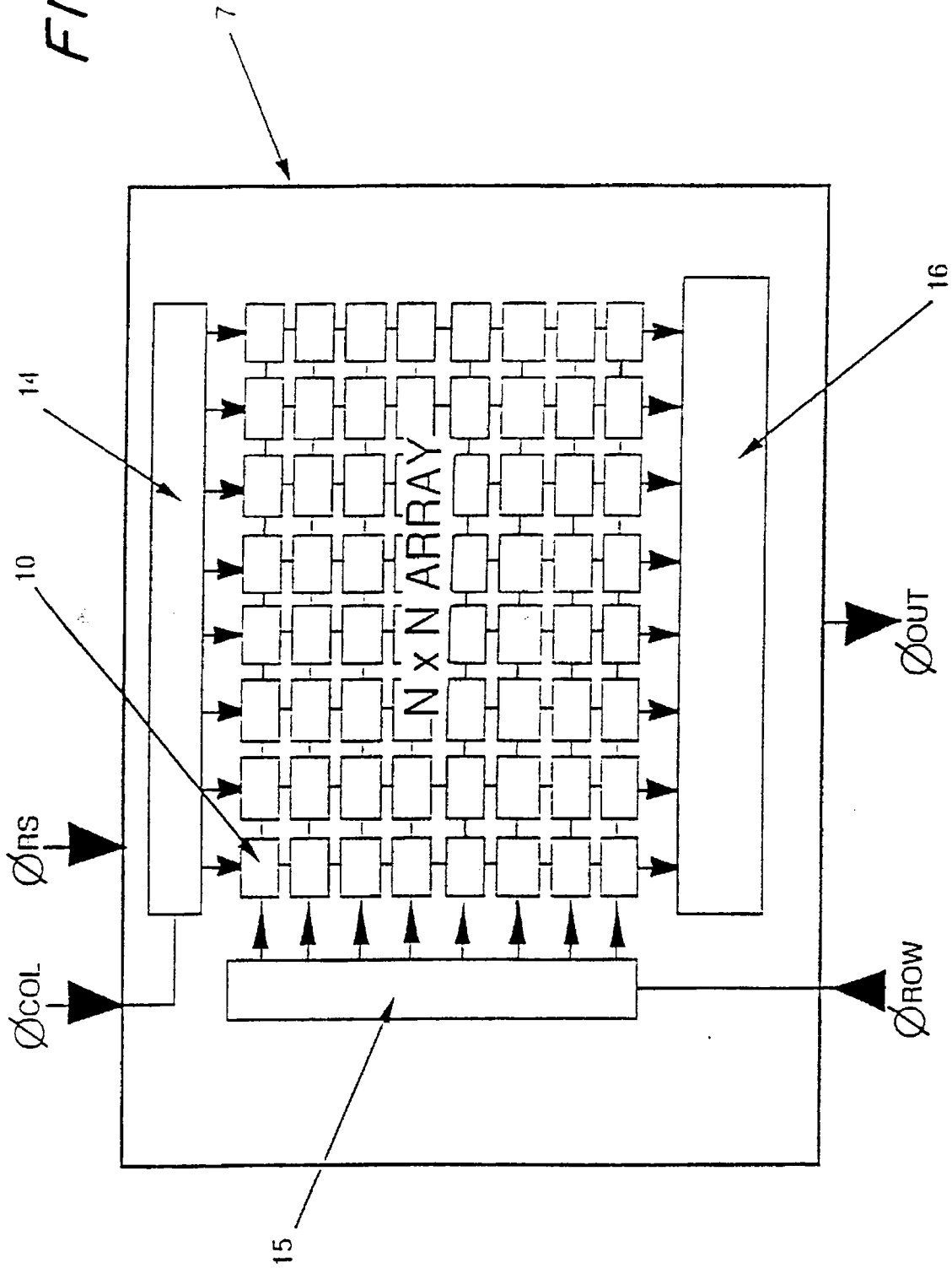


FIG. 4

