



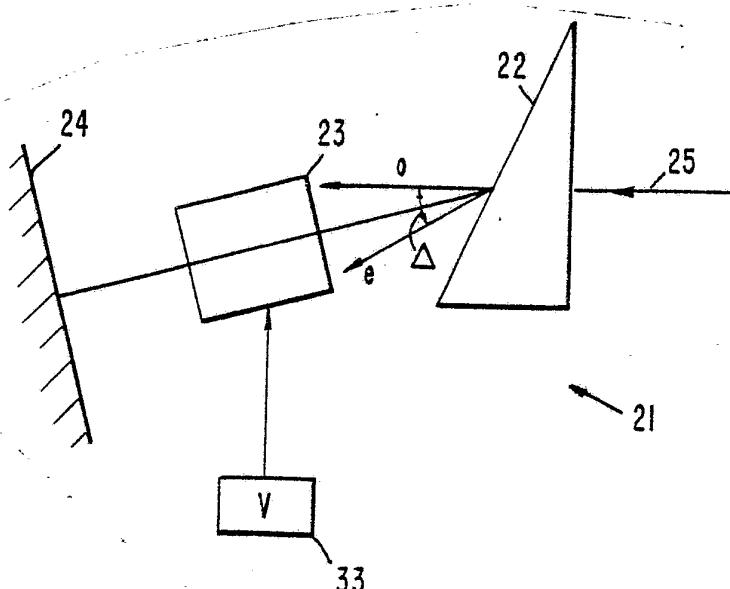
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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## (54) Title: LASER AMPLIFIER BUFFER

## (57) Abstract

A laser amplifier buffer arrangement for selectively switching laser energy in a double pass laser amplifier. The buffer arrangement comprises a wedge of birefringent material which angularly separates incident laser energy into polarized components, and an electro-optic polarization switch which may be selectively controlled to circularly polarize the polarization components of light passing therethrough. A plane mirror is employed to reflect the polarized components back through the switch and wedge. The wedge and switch are aligned in a manner such that an arbitrarily polarized input beam is separated into two orthogonally polarized components that traverse separate paths through the buffer. The polarized components are reflected back through the switch and wedge by the mirror which is aligned with the normal bisecting the polarization component separation angle. When the switch voltage is off, both polarization components are misaligned with the incident beam energy when transmitted by the buffer, therefore preventing the laser amplifier from superradiant lasing. With the switch voltage on, the polarizations of both polarized components are rotated by 90° in the double pass through the switch, therefore re-entering the wedge with opposite polarizations. Also, both polarized beams will exit the wedge parallel to the incident beam, thus permitting laser amplifier operation. A second embodiment is also disclosed which further incorporates a second birefringent wedge and 90° rotator in conjunction with the first wedge in order to produce a wider beam deflection angle and straighten the beam path. The buffer may also be employed as a Q-switch in a laser oscillator to produce an unpolarized output beam.



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## AMENDED CLAIMS

[received by the International Bureau on 28 March 1984 (28.03.84)  
original claims 1 to 6 have been replaced by amended claims 1 and 2]

1. An electro-optic switch capable of operating as a laser amplifier buffer or a laser oscillator Q-switch comprising:

a wedge of birefringent material disposed along an optical path for receiving laser energy which is parallel to the optical axis of said switch having arbitrary polarization and angularly separating the laser energy into two orthogonal polarization components;

an electro-optical polarization switch disposed along the optical path for transmitting the two polarization components without change when no voltage is applied thereto, said polarization switch rotating the polarization of the two polarization components by 90° for a double pass when a quarter-wave voltage is applied to said polarization switch; and

a plane mirror disposed along the optical path for reflecting the polarization components transmitted by said polarization switch back through said polarization switch, said mirror being aligned such that the normal thereto bisects the angle between the angularly separated polarization components.



2. The electro-optic switch of claim 1 which further comprises:

a second wedge of birefringent material disposed along said optical path between said wedge and said electro-optic switch, said second wedge being inverted with respect to said wedge; and

a polarization rotator disposed along the optical path between said wedges for rotating the polarization of energy passing therethrough by 90°.

