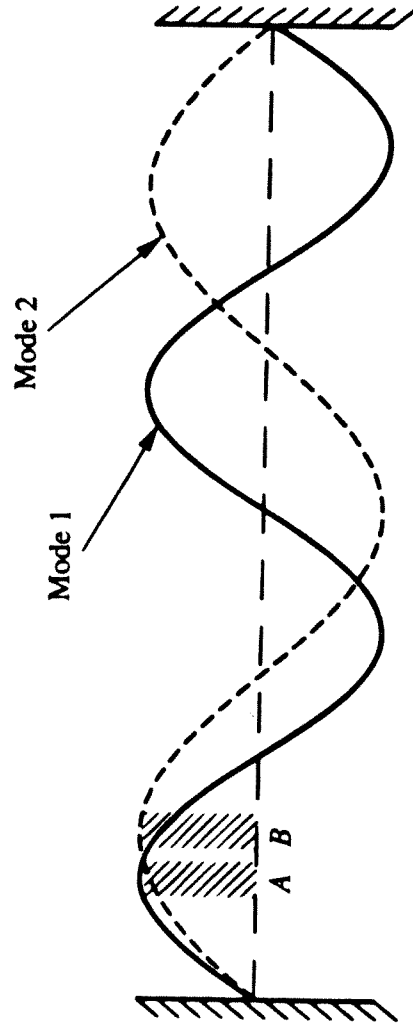


Fig 7.1. Standing wave patterns of two adjacent oscillating longitudinal modes in a laser resonator.



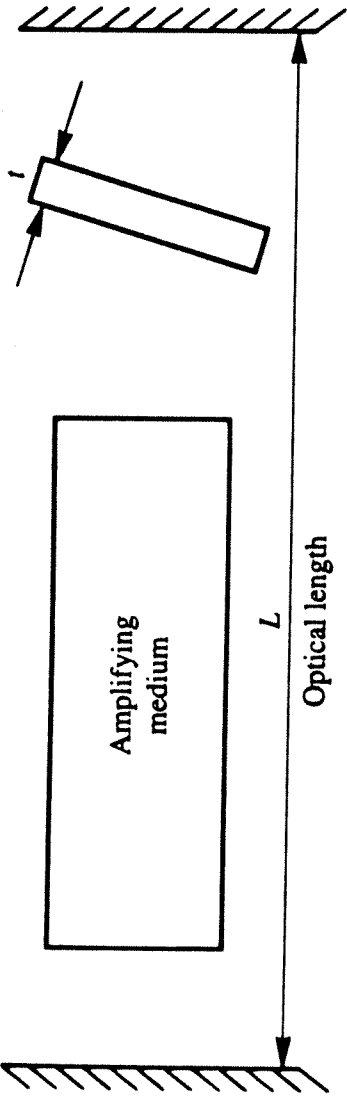


Fig. 7.2. Use of a tilted intracavity etalon to obtain single longitudinal mode laser oscillation. The optical length includes both amplifying medium and etalon.

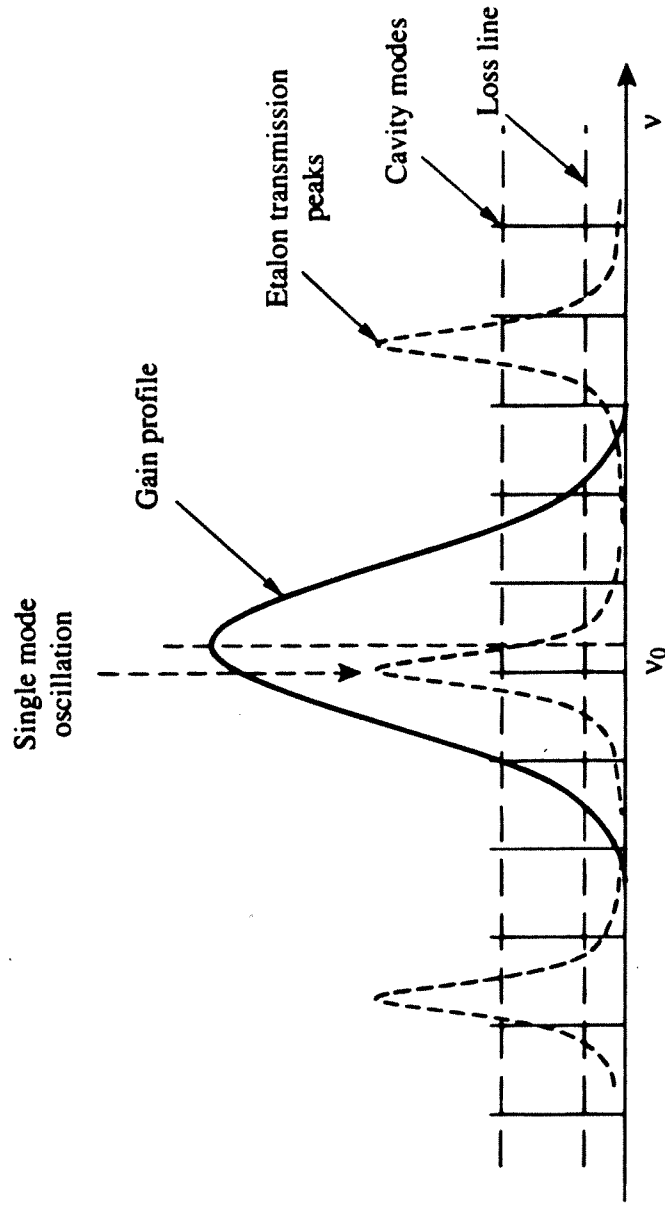
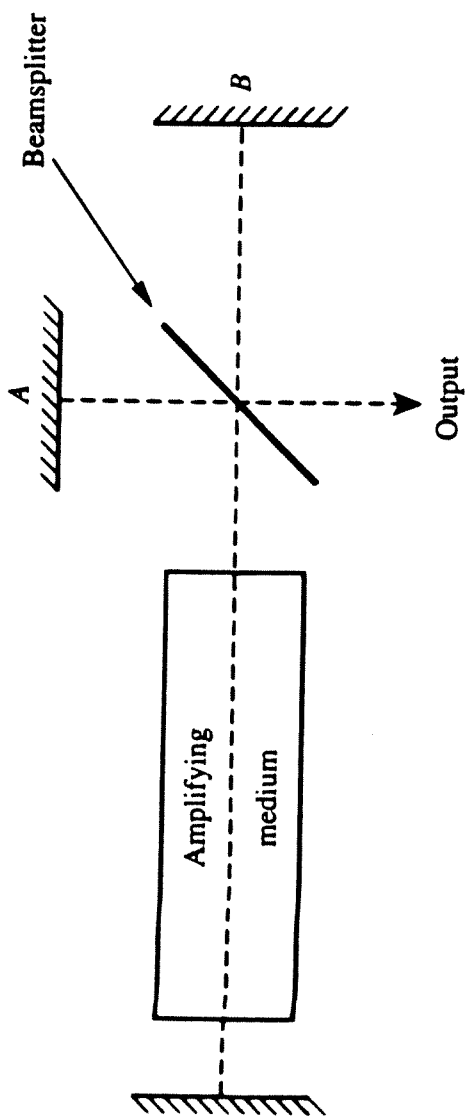


Fig. 7.3. Intracavity etalon transmission peaks superimposed on laser gain profile. Main cavity resonances span the gain curve. In this figure four such resonances lie above the loss line when the etalon is absent.

Fig. 7.4. Laser resonator incorporating a Fox-Smith interferometer for encouraging single longitudinal mode laser oscillation.



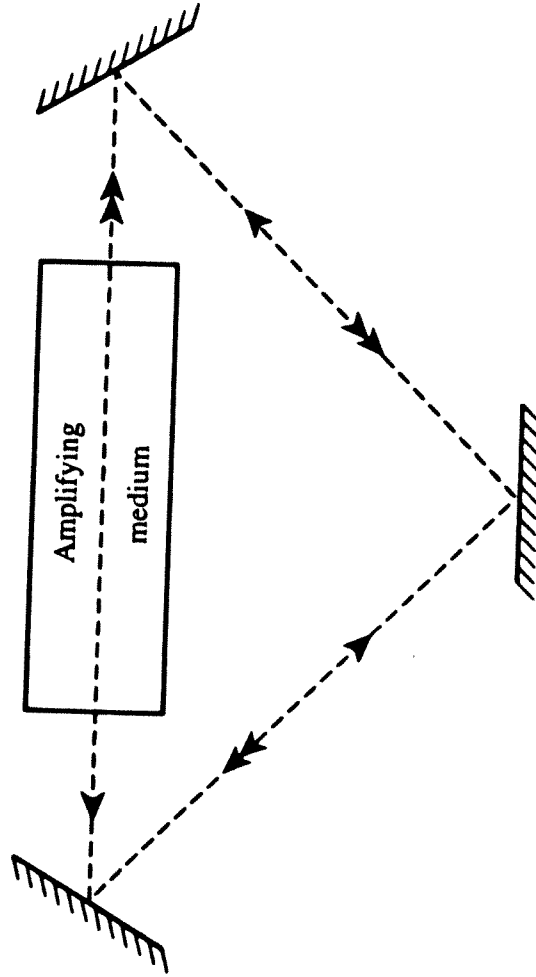


Fig. 7.5. Ring laser configuration with counterpropagating traveling wave fields. Unidirectional laser oscillation in such a cavity suppresses spatial hole-burning and will encourage single mode oscillation.

Fig. 7.6. 'Twisted-mode' arrangement for obtaining single mode operation of a laser by eliminating standing waves in the amplifying medium.

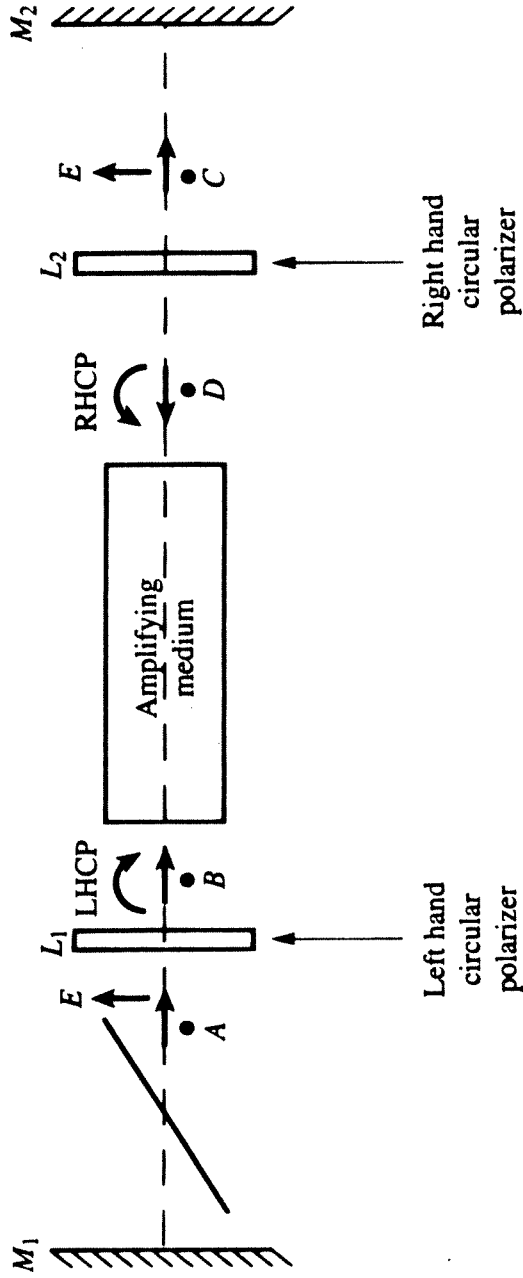


Fig. 7.7. Mode-locked pulse trains calculated from Eq. (7.15) (a) $N = 5$ and (b) $N = 20$.

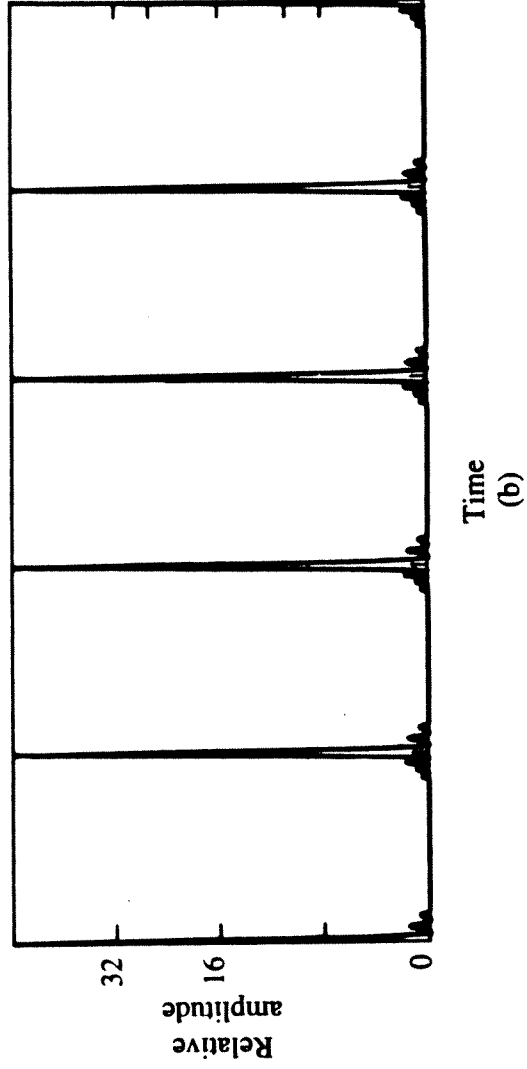
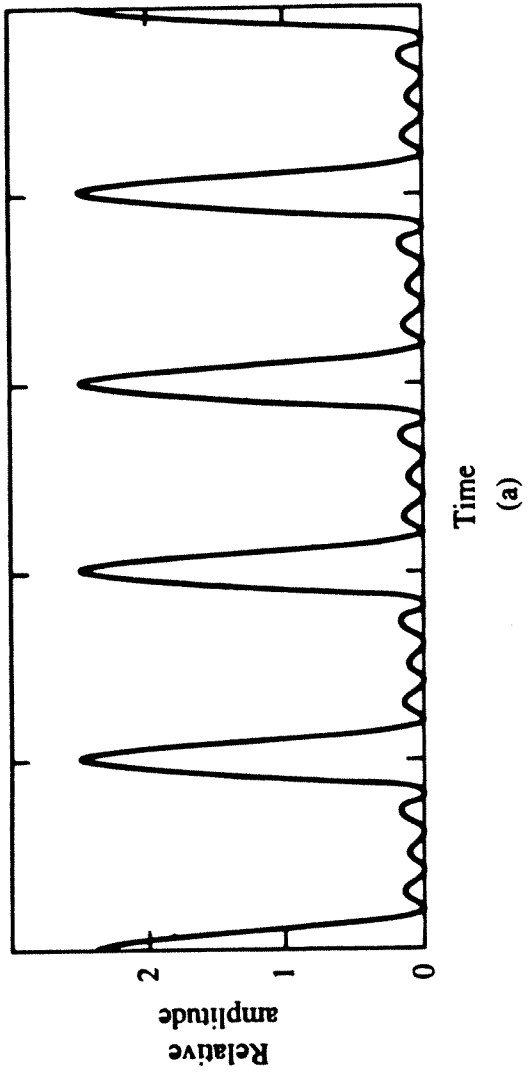


Fig. 7.8. Schematic diagram for passive mode-locking with a saturable dye.

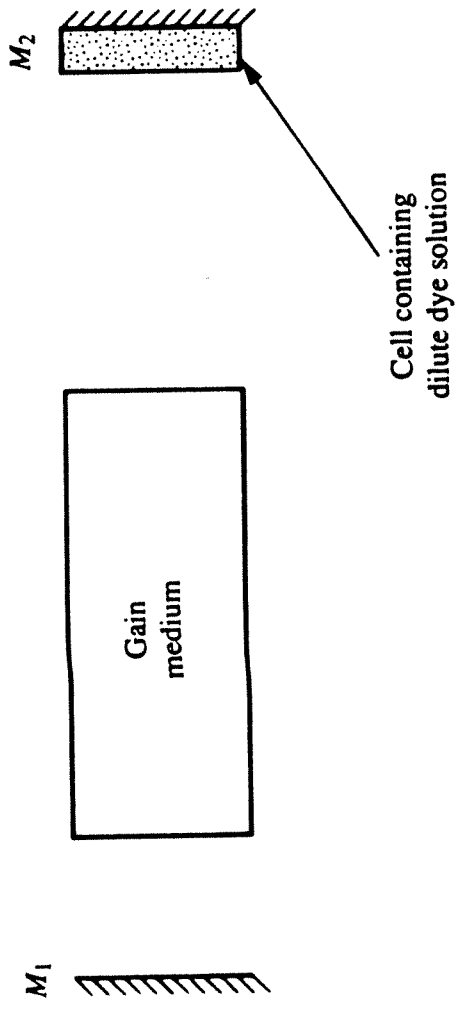
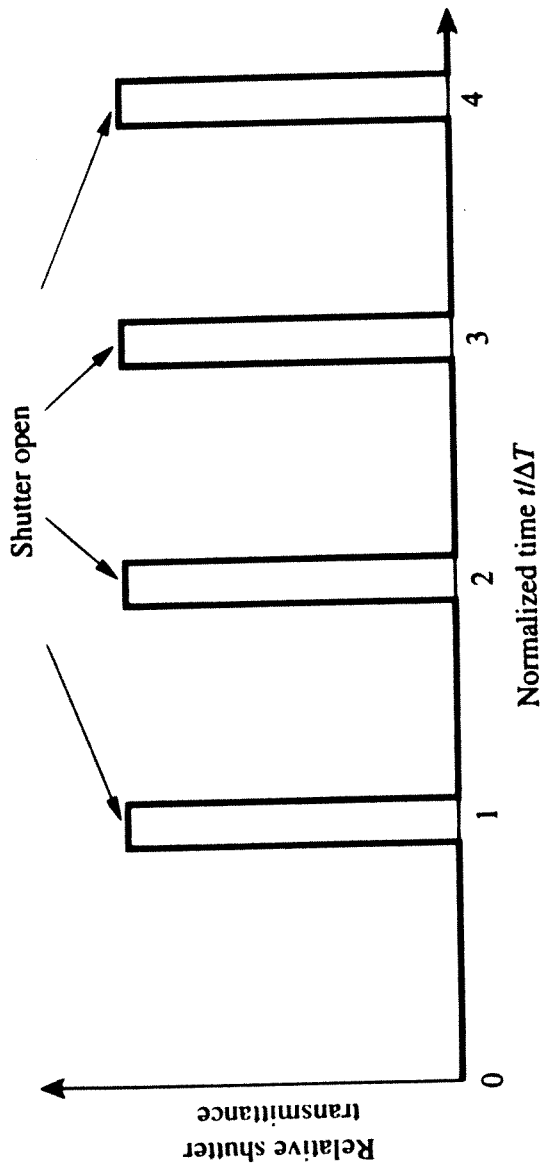


Fig. 7.9. Time sequence of opening of an intracavity shutter used to produce AM mode-locking.



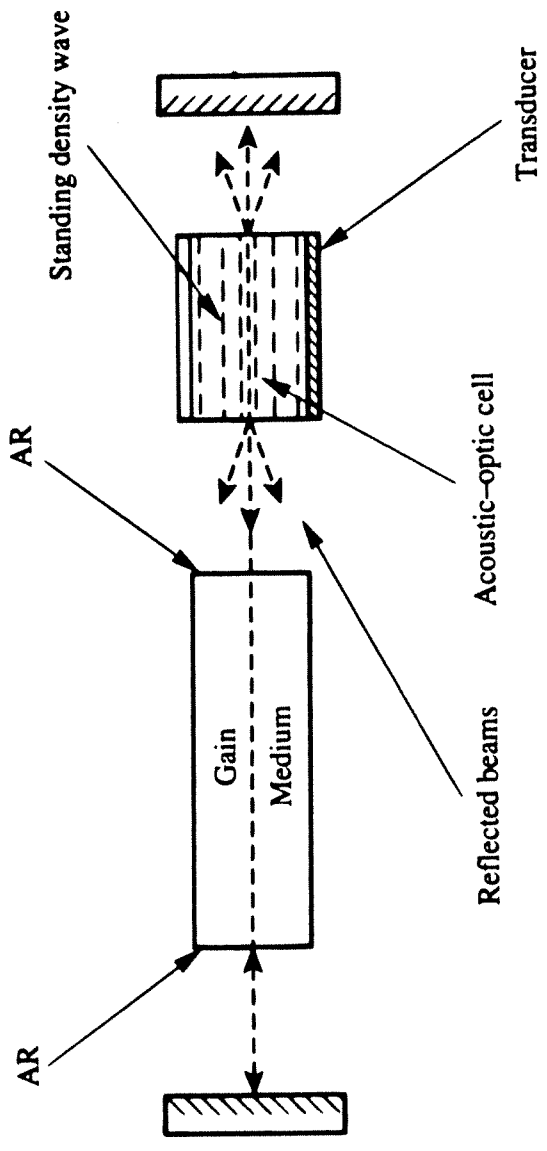


Fig 7.10. Arrangement for mode-locking with an intracavity acousto-optic modulator (AOM) AR - antireflection coated face.

Fig. 7.11. System for generating ultrashort pulses from a neodymium glass laser system^[7.7]. The CW Ar⁺ laser pumps a Nd:phosphate glass laser that is mode-locked with an acousto-optic modulator (AOM). The mode-locked pulses are further amplified in a *regenerative amplifier* where they may make at least 60 round trips before being switched out of the cavity with the Pockels cells (PC) (an electro-optic crystal that can switch the polarization state of the beam). (Courtesy of Professor Chi H. Lee.)

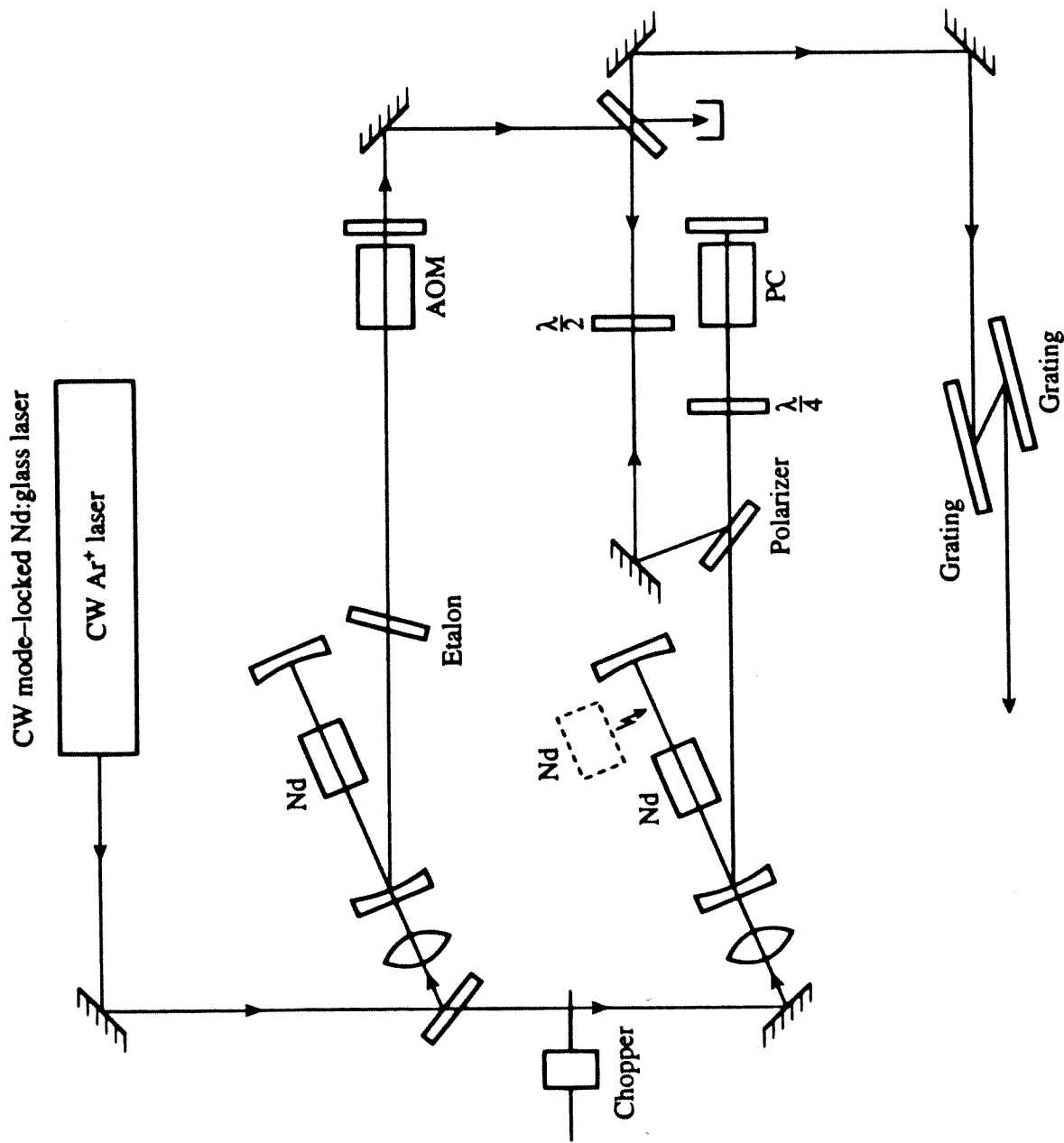
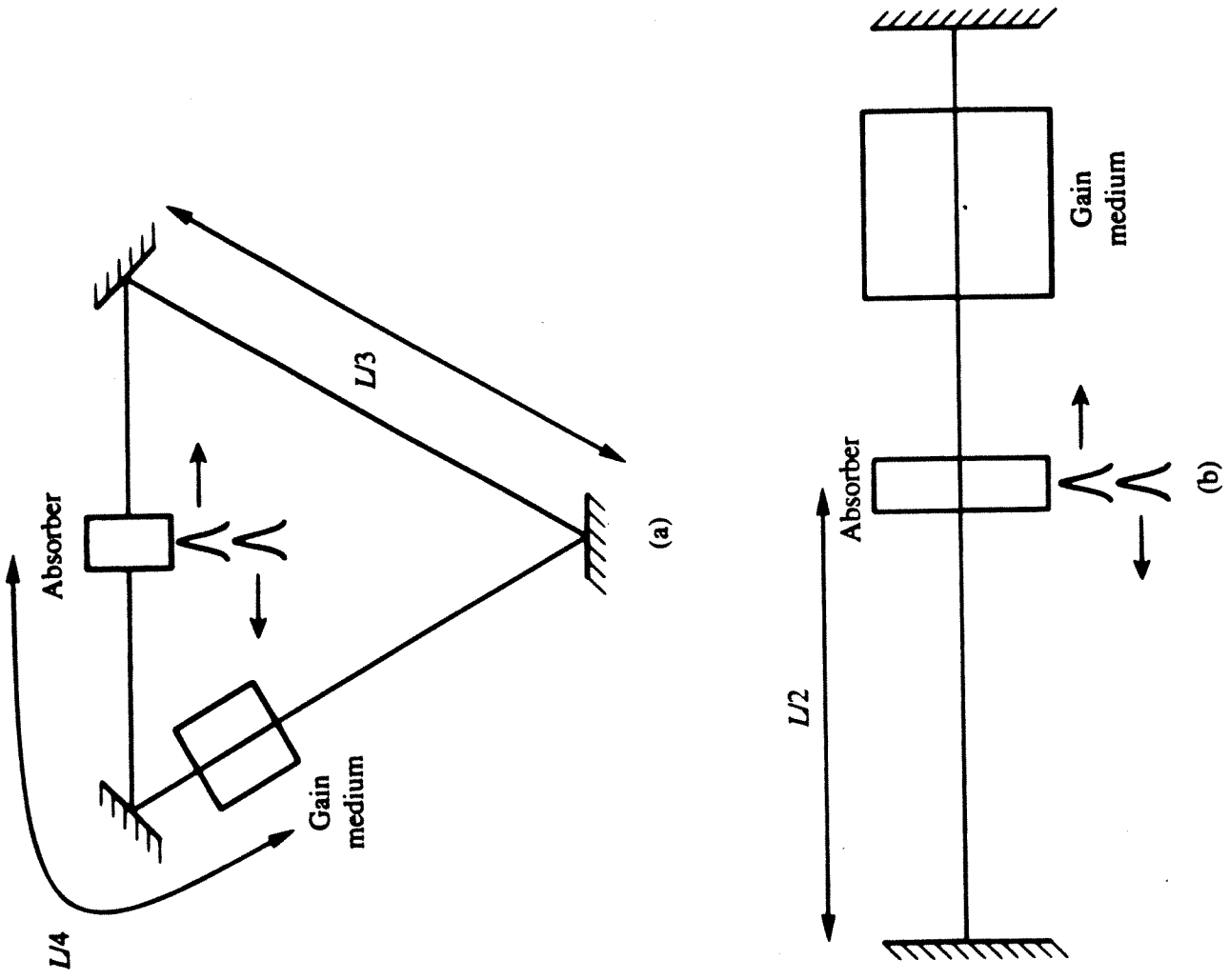


Fig. 7.12. Schematic placement of saturable absorber for CPM mode-locking: (a) ring cavity, (b) linear cavity.



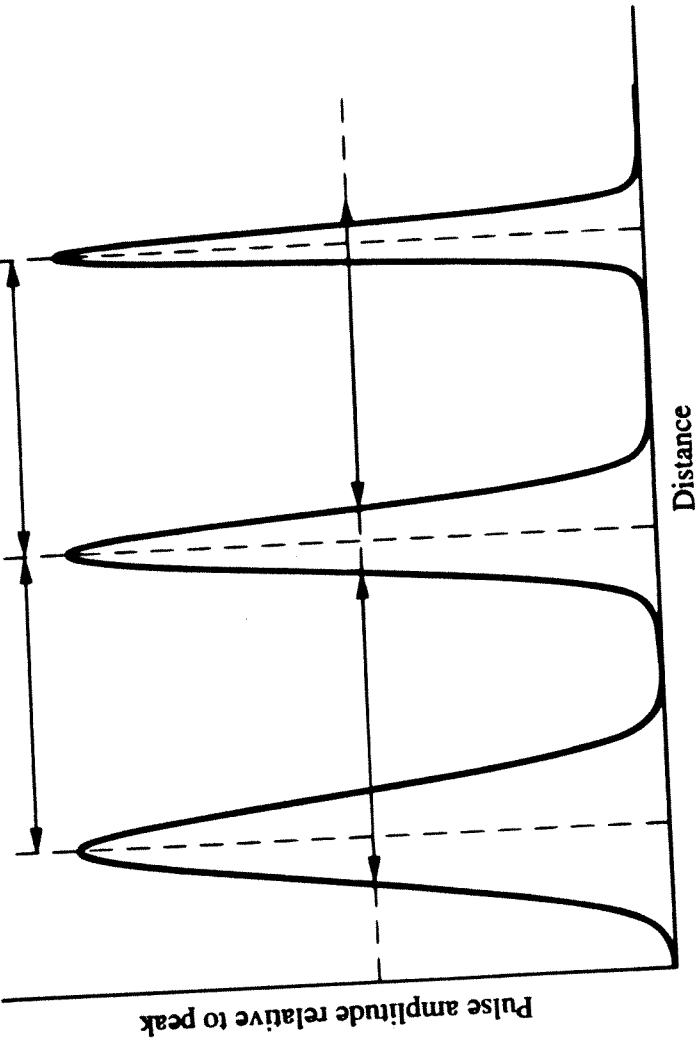


Fig. 7.13. Pulse compression resulting from the travelling edge of a pulse catching up with its leading edge. The arrows in the figure correspond to equal time intervals.

Fig 7.14. Diffraction
grating pair used to
produce pulse compression
of a 'chirped' pulse.

