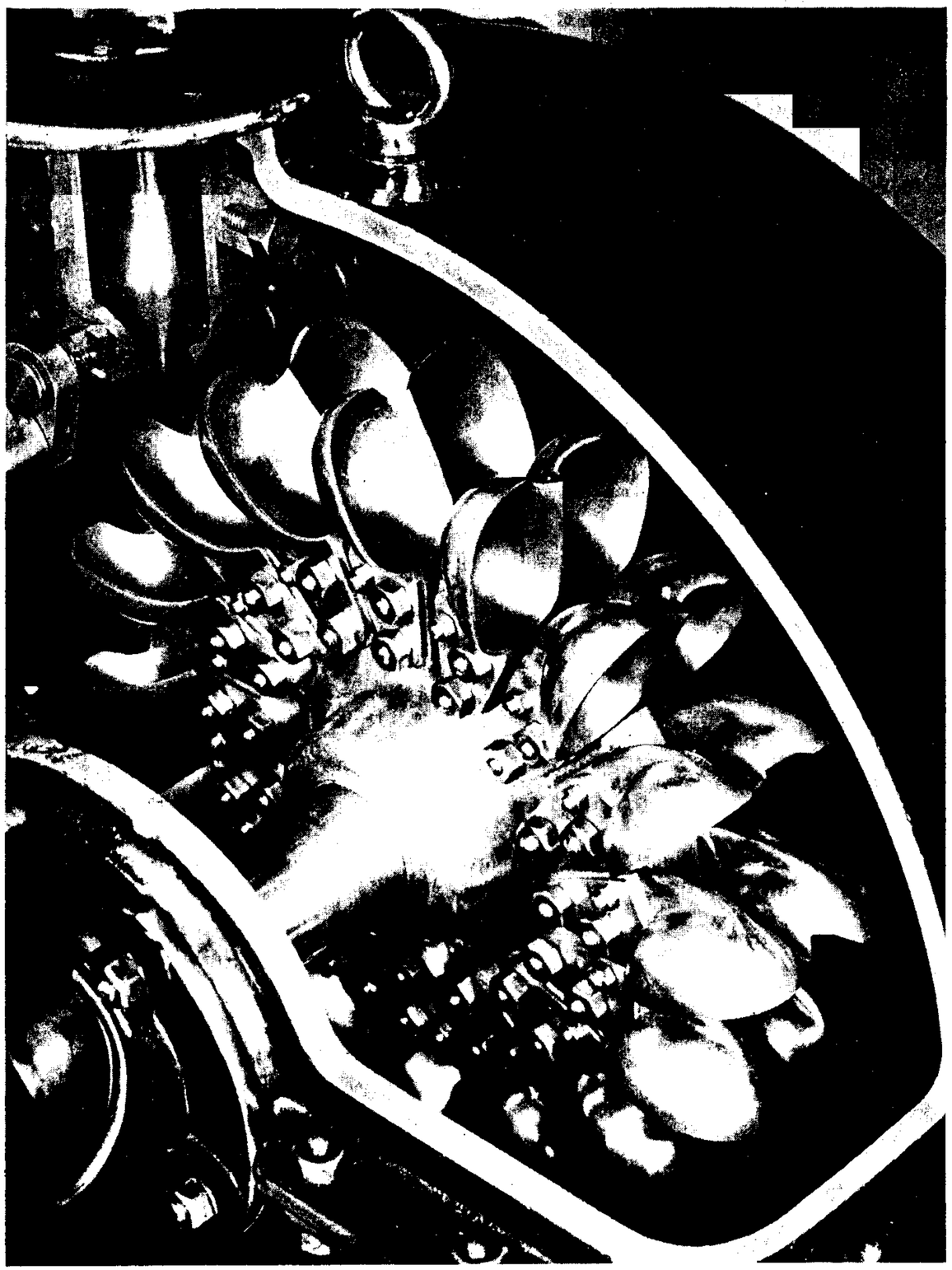
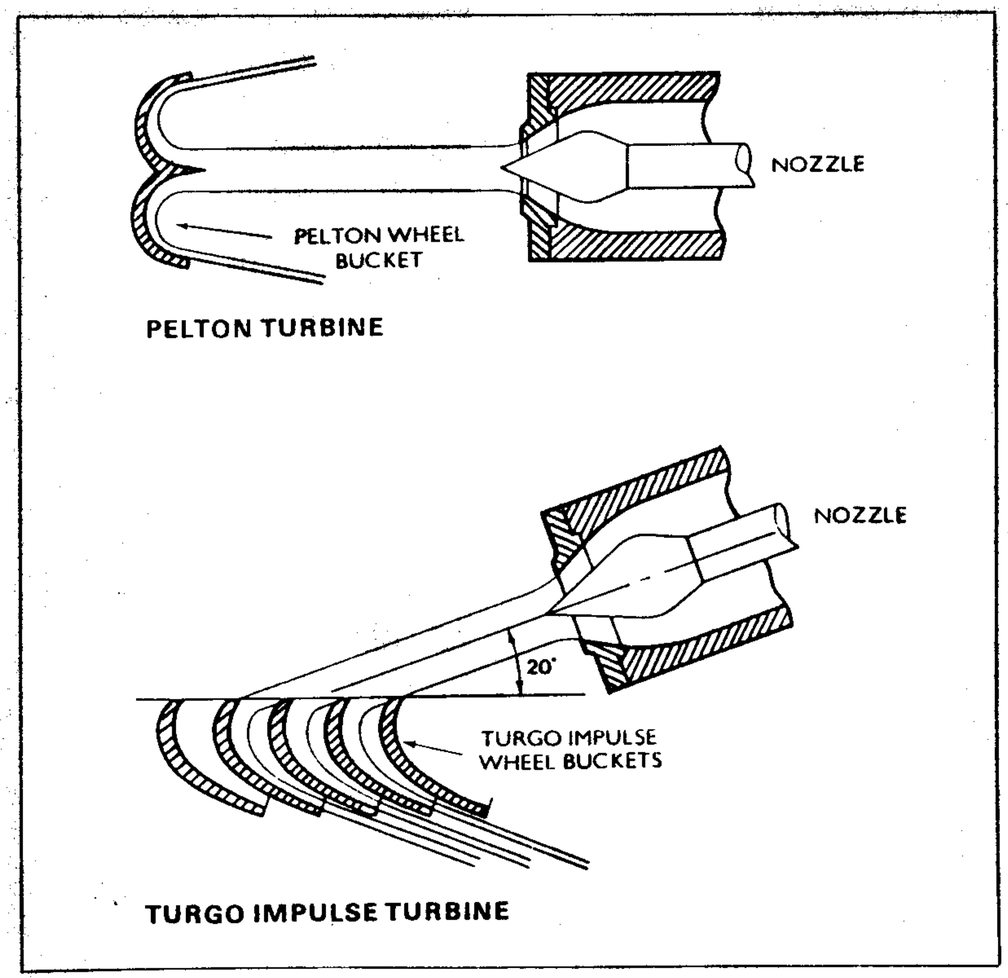


15 Model of a Pelton wheel with nozzle regulator.

there has been little change in subsequent designs. Small improvements in bucket shapes and baffles to prevent water splashing back on to the runner have raised the efficiency of large Pelton Wheels to more than 90 per cent. Vertical shaft Pelton Wheels are made in powers up to 140,000 HP, and sometimes as many as 6 jets are used to enable the machine to run at the highest possible speed. Heads up to 1,500 metres have been used.

The Pelton Wheel suffers from the disadvantage that for a runner of a given mean diameter, say one metre, there is a maximum diameter of jet which can be used. The ratio of runner diameter to jet diameter is known as the 'runner jet ratio' and, in very general terms, has a normal minimum value of about 9:1. Hence the biggest jet which could be used on a one metre wheel would be one ninth of a metre (about 111 millimetres) in diameter. To obtain maximum efficiency the velocity of the runner at its mean diameter (the jet centre line) should be about half the jet velocity which is fixed by the operating head at the nozzle. If, for example, the head is 100 metres the jet velocity will be 44 metres per second. Hence



16 Diagram showing the difference in principle between the Pelton Wheel and Turgo Impulse Turbine. Note also the 'spear' or 'needle' nozzle.