(C) Combustion Stroke (See Figure 2-3)

With the intake valve S and the exhaust valve E closed, fuel, pressurized by the fuel injector, is injected in atomized form shortly before the end of the compression stroke of the piston (P), i.e., just before the crank reaches top dead center, and auto-ignites upon contact with the high-temperature air. The fuel undergoes explosive combustion within the cylinder, and the rapid expansion force of the combustion gas pushes down the piston, which in turn becomes the rotational force of the crankshaft via the connecting rod. This stroke is called the combustion stroke or power stroke.

(D) Exhaust Stroke (See Figure 2-3)

If the exhaust valve E is opened, the combustion gas is discharged into the atmosphere as the piston rises past bottom dead center, and is completely exhausted when the piston reaches top dead center.

[Diagram: Fragmented Labels]

B Exhaust Stroke Intake Stroke Piston Stroke Stop

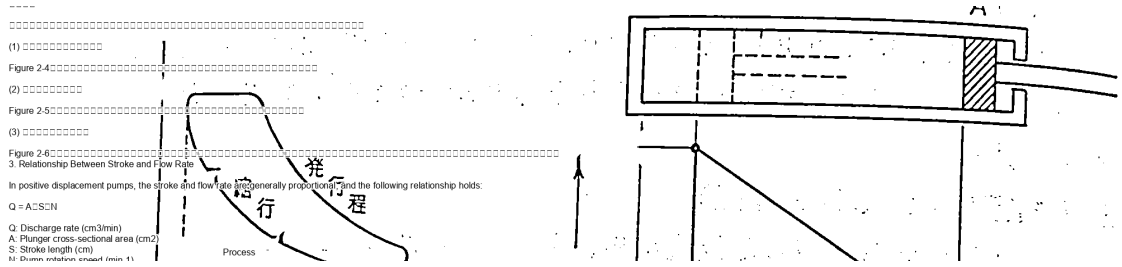

Figure 2-4 Indicator Diagram of a 4-Stroke Engine

As described above, the crankshaft makes two rotations during the piston's (P) four strokes (two reciprocations), and the power stroke occurs only once during this period.

Figure 2-4 shows the indicator diagram (PV diagram) of a 4-stroke engine, which generally represents the state change of the gas inside the cylinder when gas is introduced into the cylinder and the piston is pushed in from position A to position B, or conversely, when the piston is pushed from position B to A by the expansion force of the gas. The pressure is represented by P on the vertical axis, and the volume is represented by V on the horizontal axis, showing the relationship between the two (the change in gas volume and pressure inside the cylinder) in a diagram.

If the volume when the piston is at A is V1 and the pressure is P1, then at B, the pushed-in volume becomes V2, and its pressure is represented by P2. This diagram is called a PV diagram

or indicator diagram.