In immediate connexion with the valves and passages of a steam-engine, which admit the steam on alternate sides of the piston to do its work, and afterwards dis charge it, we may consider the means by which the engine is rendered automatic, or capable of performing its labour in the most perfect manner, without the continual assistance of a man to open and shut its valves. There are two ways in which valves are worked by the steam-engine itself. The first of these is by the agency of some part of the engine that happens to move up and down, or perform a reciprocating motion, and the other is by the agency of some part of the engine which revolves. The following is a simple method, which we have seen applied to the short D slide, already described. In figure 95, A B P is the cylinder, P the pis ton, acting on the end L, of a great lever L L2, raising and depressing it alternately, while the other end L2, united by a connecting rod L2 R to the handle or crank of a Iarge wheel, turns it round. The manner in which the steam-valves are moved is by the long vertical bar T T, suspended from the lever L L2, so as to move up and down with it. This bar T T carries two projecting plugs of wood s s2 upon it, which strike alternately up and down the handle *l l2* at the bottom and top of the stroke, and so produce the reciprocating motion of the slide valve D,and by admitting the steam on alternate sides of the piston, and discharging it at the opposite ports, pro­

duce the continuous motion of the engine. In the figure, the steam is represented in the act of forcing down the

piston ; but when the piston gets near the bottom, the plug *s* will have come in contact with the valve-rod *l**l2,* and will have forced it and the slide valve D into the opposite position, and so permitted the steam, formerly above the piston, to pass into the open air, while the steam on the