



HORIZONTAL ENGINE WITH RADINGER'S VALVE GEAR.

HORIZONTAL ENGINE.

We illustrate, on these two pages, a small horizontal engine constructed by the Maschinen und Waggonbauabriks Actien Gesellschaft, in Simmering, late H. D. Schmidt, and which is fitted with valves and valve gear arranged upon a system invented by Professor Radinger, of Vienna.

About the engine itself we need not say much. The bed-plate is carried along underneath the piston and connecting rods; the guide plate and the plummer block are cast with it. The cylinder is not overhung, but is supported by a substantial foot, which is made separate, we presume, on account of the complexity of the cylinder casting.

The valves are three in number, and are arranged on three parallel vertical spindles, the whole of them deriving a continuous revolving motion from a horizontal shaft driven from the crankshaft by spur gearing, the proportions of which are so arranged that all the valves have the same angular velocity as the crankshaft, that is, that they rotate revolution for revolution with the engine. The centre valve is double, consisting of two cones revolving one within the other in opposite directions. The outer cone governs the steam admission, and may therefore be called the induction valve, the inner cone governs the cut-off, and may be called the expansion valve. The governor is so arranged, as will shortly be seen, that the motion of the balls alters the relative positions of these two

valves, and by this means alters the cut-off in a way analogous to that in which it is altered by the common right and left-handed screw arrangement for flat valves. The other valves are in shape not unlike the exhaust valves of a Corliss engine—that is to say, they fill up more than half the chamber in which they rotate; each one governs the exhaust from one end of the cylinder. Fig 3 shows the relative position of the valves in plan, and the manner in which the ports are arranged.

The bevel pinion on the end of the horizontal spindle gives motion in opposite directions (see Figs. 3 and 4) to two bevel wheels. The upper wheel is fast to a bush, which forms the lower end of the induction valve. The lower wheel is keyed on to a spindle, which passes right up through the valves, perfectly unattached to anything, until at the top it forms the spindle of the governor. There is a slot in the governor spindle, near its upper end, and a cross piece, which is connected at each end to the pins in the sliding bush of the governor, passes through this slot. Between the governor spindle and the sliding bush there is another bush, which, being carried downwards (in several pieces), is rigidly connected with the expansion valve. This intermediate bush has a slot on each side, through which the cross piece above referred to passes; these slots are placed *spirally*, however, at a small angle to the vertical. The expansion valve is driven by the pressure of the cross piece against the sides of these