different parts. In figs. I and 2 A A is the cylinder, P the piston, *Pp* the piston rod, *lib* the parallel motion, LLL the great lever. The pillow blocks L*l*, in which the centre of the great lever works, rest on the spring beam UU, whose ends are secured to the walls of the building in the manner shown on the next plate. The centre of the spring beam is sustained by the columns VV and their enta­blature *u*, which crosses the building and has its ends secured to the walls like those of the spring beams. At the other end of the great lever are the connecting rod LK, the crank KX, and fly-wheel WW. Returning to the cylinder we have, DD the slide-valves and their casing ; *dd* the packing ports. The valve-casing termi­nates below in EE the eduction-pipe leading into the condenser C. G is the air-pump, F the place of the foot­valve, *h* the air-pump piston-rod. The condenser and air-pump with their appendages are placed in the cold well N. M is the hot well into which the contents of the air-pump are discharged, and from which the hot water pump *m* draws its supply by the pipe *m'.* The pipe *oo* leads from the hot water pump for the sup­ply of the boiler. The cold well is supplied from the cold water pump *n* by the pipe *n n'.* The rods for working the hot and cold water pumps hang from a stud at either side of the lever at *m.* The governor *ww* is supported on a bracket *tt,* which bridges across the main shaft. The influence of the governor is conveyed to the throttle-valve by the levers and connecting rods *wwww.* The valves are worked by the eccentric *xxxx. ff is* the eccentric shaft which carries the gab-lever *f* on which the eccentric rod acts ; it also carries the levers for working the side rods of the valves, the levers which carry the counterbalance weight, and the socket for the starting lever. The small pillars TT, which surround the cylinder, are surmounted by an entablature which serves as a support for a gangway round the cylinder.

The remaining figures on the plate represent in detail the different parts of the engine which we have just de­scribed, separated from each other, in order more clearly to exhibit their construction. Figs. *A* A' *a a'* show the details of the cylinder. In A A' is shown the upper and lower ports of the cylinder at 1 and 2, and the steam port at 3. In A', 4 is the cylinder cover, and 5 the stuf­fing box. *a* is a horizontal section of the cylinder, and *a* a plan of the cylinder cover.

Figs. DD' *dd'* show the slide-valve casing ; D a front view, D' a side view. 1 and 1 are the packing ports, 2 and 2 the packing-port covers, 3 the eduction pipe, *d* the cover of the slide-valve casing, 4 its stuffing-box, *d'* a section of the casing. Figs. C, G, F, show a side ele­vation of the condenser, foot-valve, and air-pump ; C,' G', F, a section of these; and *c*, *g, f,* a plan of them. 1 is the cover of the foot-valve, 2 and 3 a section and front view of the valve. Fig. L shows a side view of the great lever, L 1 a top view, and L 2 a transverse section through the centre of it. Figs. KK' show a front view and section of the crank. Figs. XX*x* show a side view, an end view, and a plan, of the crank shaft pillow block. Figs. *l, l*I, Z2, show a side view, an end view, and a plan of the pillow block for the main centre of the great lever. Figs, *mm* show a vertical and horizontal section of the hot water pump, and figs, *nn'* of the cold water pump. Figs. B 1, 2, 3 are the details of the main links of the parallel motion ; *b* 4, 5,6,7,8 details of its air-pump links; 9, 10, 11,12 side and top views of its radius and parallel bars. 13, 14 is the clutch for the top of piston-rod ; 15, 16, gudgeon and clutch for the top of air-pump rod ; 17, 18, top and side views of the ring gudgeon to which the parallel rods are attached ; P piston-rod, H air-pump piston-rod, *h* air-pump rod, *gg* cold water pump-rod and piston-rod, and *g'g'* hot water pump-rod and piston-rod ;

*X* the eccentric, WW, 1,2,3, 4 details of the fly wheel, O main centre or gudgeon for the great lever. PP 1 plan and section of the piston, *w w'* 1, 2, 3, 4, 5 details of the governor, *w* the spindle, *w'* the slide, 1 1 the radius arms to which the balls 5 5 are attached, 2 2 the radius arms which cause the balls to act on the sliding collar *w',* 3 and 4 the stay for confining the motion of the balls, *t* 1 2 is the slide-valve rod and side rods, *t* 3 is the slide- valve cross-head, R R' a side and front view of the con necting rod.

Plate cccclxx exhibits a Sectional Elevation of a Condensing Engine. This description of house engine is the design of Mr M'Naught of Glasgow, and has been extensively applied by him to cotton, silk, and saw-mills. The principal peculiarity in its structure is the arrange­ment by which no further masonry is required for its foundation than the building in which it stands, the usual cold well being dispensed with, and the whole structure connected by cast-iron beams with the walls of the house. The cylinder AA is attached immediately to TT, the cast-iron beams of the floor, which are deeply bedded in the wall at T and T, and rests directly upon the large vessel C, which forms the condenser, and is supported likewise by beams YY, which are bedded in the walls. The condensation is effected by injection alone, without the usual accompaniment of a cold well around the con­denser, an appendage that may safely be regarded as by no means indispensable to the practical perfection of the vacuum—when the vessel itself is formed with few joints. The transverse beams of the buildings are sup­ported by two pillars directly under the centre of the great lever LLL, so as to support the main centre L; and the crank-axle X and the axis Z of the fly-wheel W, are supported on UU, another beam of cast iron.

The steam enters the house through the pipe SS, passes round the cylinder to SS, around the long slide- valve DD, being confined to the middle of it by the valve packing *hh,* and after performing its duty in the cylin­der, passes out at EEE into the condenser C, where it is finally condensed into water. Hence it is drawn off at the foot-valve F by the piston H of the air-pump G, and delivered by the discharge-valve M into N, the hot well. The slide-valve DD is worked by the eccentric gear *xxxx* and the rod *d*D through a moveable stuffing-box *dx.*

Plates cccclxxi, cccclxxii. These plates represent the high-pressure engines which are employed to work the inclined plane at the Liverpool station on the Liver­pool and Manchester Railway. They are beautiful and in many respects highly judicious ; they are the work of Messrs Mather, Dixon & Co., Liverpool.

WWW, Plate cccclxxii, is the great wheel which works the rope that draws the railway train up the in­clined plane ; the rope is contained in a groove in the edge of the wheel. A clutch *kk* connects or disconnects the crank-axle XXX with the wheel WW ; the cranks KX, KX, KX are placed at right angles, so that when one is on the centre the other is at the furthest distance from it. K*k*, the connecting rod, hangs down from LL, the ends of the levers. The centre of the side levers, I V., rests on a truss at no greater height than three feet above the floor of the engine-room. L*p* is a side rod by which the levers are united to the cross-head *rpr.* The steam in this instance comes about a quarter of a mile from the boilers to the cylinders A A by the steam­pipe SSS. Fig. 2 is a section of the steam-valves and cylinder. The valves DD are short D-slides, surround­ed by steam, and by the underside of the valves the escape takes place through the space E ; *d*D is the valve- rod moved by the usual valve-gear *xxx.* The eccentric *XXX,* Plate cccclxxi., is placed on a long shaft from the