tained by an elegant and rigid Gothic framing, render­ing them, notwithstanding the ponderosity of their differ­ent parts, entirely independent of the vessel on which they are placed. A A are the cylinders, B the slide-valve casing, C the condenser, D the hot well and air-vessel placed on the top of the condenser. E the air-pump, FF the feed-pumps. The moving parts of the engine are as follow:—K the cylinder piston rod, I the cross­head, H the cylinder side rods descending to the great side levers GGG. Connected with the parts last de­scribed are the radius rods of the parallel motion L, the motion side rod L', and the parallel motion shaft *I,* V the valve or weigh-shaft on which is fixed the valve lever W, whose other end is inserted into a clutch on the slide- valve link *c*. On either side of the centre of the great lever depends a side *rod ff,* to work the bilge and brine pumps, and to its extremitty are attached the links of the cross-tail of the connecting rods, P the links, Q the cross-tail, R the connecting rod. To the upper end of the connecting rod is attached the crank S; T is the inter­mediate or crank shaft, T'T' the paddle-wheel shafts. On the crank-shaft is placed the eccentric U ; and *uu* is the eccentric rod working the eccentric gab-lever *v* on the valve or weigh-shaft *t t*2. Y *y y* the expansion valve apparatus, *h h* escape valves at top and bottom of cylinders, X paddle wheels, *k* lever for starting the engines, 1 l steam-pipes, 2 2 waste water pipes from hot well, 3 double force-pump for filling boilers, extinguishing fires, and washing decks, 4 4, engine beams, *5 5* 5 5 midship section of vessel, 6 6 thick planks checked in upon and bolted through the timbers thus:—

Plate cccclxxx. Side and end elevation of one of the engines of her Majesty’s mail packet, Urgent, arid also of the Actæon, built by Messrs Caird and Company of Greenock. The Urgent plies between Liverpool and Dublin ; the Actæon between Liverpool and Glasgow. Both vessels have been very successful : they are swift boats, and consume a small amount of fuel. Their gene­ral dimensions are here noted.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Urgent. Ft. in. | Actæon. | |
| Ft. | in. |
| Length of keel and fore-rake, | 172 1 | 171 |  |
| Breadth within paddle space, | 26 | 25 | 10 |
| Depth of hold, | 17 5 | 17 | 3 |
| Diameter of paddle-wheel, | 24 6 |  |  |
| Length of floats, which in the Urgent | are |  |  |
| of Galloway’s patent, in 3 breadths | of |  |  |
| about 9 inches each, | 8 10 |  |  |
| Diameter of cylinder, | 5 2 | *5* | 2 |
| Length of stroke, | 5 9 | 5 | 9 |

The power of each of the engines is 140 horse power. The paddle-shaft makes about twenty revolutions per minute. The tonnage of the Urgent, by the old law, is 56263/94—of the Actæon 55192/94. A A is the cylinder, C the condenser, E the air-pump, H the cylinder side rods, I the cylinder cross-head, B the valve-casing, W the valve lever, W' W the back balance, G GG the side levers, P the cross-tail links, Q the cross-tail, R the connecting rod, S the crank, U the eccentric, N the air-pump side rods, M the air-pump cross-head.

Plates cccclxxxi, cccclxxxii, cccclxxxiii, represent the engines of the Achilles, also built by Messrs Caird and Company, to ply between Liverpool and Glasgow. Plates cccclxxxi, cccclxxxii, show the two side eleva­tions of one of the engines ; and plate cccclxxxiii a section of the vessel to a lesser scale, with the engines, paddle-wheels, &c., *in situ.* The arrangement of the framing of these engines is highly beautiful. The entablature supported by the columns, uniting both engines in one design, gives massiness of appearance, as well as great strength to the structure. In plate cccclxxxii is seen the apparatus for working the en­gines expansively. On the crank-axle T is placed a series of cams, *t t t,* which act upon the roller of the expansion­valve tumbler. Y *y y y* are the expansion-valve connecting rods and levers. Z is the valve chest, and the valve is of the kind called equilibrium valves, or crown valves. The other parts are A the cylinder, B the valve-chest, C the condenser, D the hot well, E the air-pump, F the feed and bilge pumps, GG the great lever, G' its main gudgeon, II the cylinder side rods, I the cross head, K the piston-rod, L L the parallel motion, M the air-pump cross-head, N the air-pump side rods, O the air-pump piston-rod, P the connecting rod cross-tail links, Q the cross-tail, R the connecting rod, S the crank, U the eccentric pulley or cam, *u u u* the eccentric rod, V the valve-shaft, W W the valve-lever and counter balance lever.

Plates cccclxxxiv, cccclxxxv, cccclxxxvi. The engines exhibited in these plates are a pair of 110 horse power each, constructed by Messrs Fawcett, Pres­ton & Co. of Liverpool.

Piate cccclxxxiv shows the side elevation of one of these engines. Plate cccclxxxv shows the eleva­tion of the crank end of both engines ; and plate cccclxxxvi the cylinder end of the engines, drawn to- a somewhat smaller scale. The letters refer to the same parts as in the engines already described, and it is unne­cessary here to repeat the description.

Plate cccclxxxvii. In this plate is given a repre­sentation of a single marine engine of 65 horse power, with a stroke of four feet. Fig. 1 is a side elevation: fig. 2 a plan or bird’s-eye view; fig. 3 an elevation of the cylinder end ; and tig. 4 an elevation of the crank end. The same letters indicate the same parts as in the former figures.

Plate cccclxxxviii, fig. 1. is an end view, and fig. 2 a side view, of a double towing-engine of forty-five horse power and three feet six inches' stroke. The most strik­ing peculiarity of this engine is, that the paddle-wheel shaft is separate from the crank-shaft, and driven by it through the intervention of toothed wheels. T is the cranks haft, with its spur wheel driving the spur wheel of the paddle-shaft T2. The other letters refer to the same parts as before.

Plate cccclxxxix. In this plate are represented two engines of direct connexion, constructed by Messrs Tod and M'Gregor, Glasgow.

In figs. 1 and 2 of this plate, the crank S of the engine is placed directly above the cylinder A ; the piston-rod K carries a cross-head J, which is guided to move in the vertical direction by two cross guides *gg,* one at each extremity, whose ends slide upon the vertical pillars *pp,* which sustain the framing for the support of the crank-axle. From each end of the piston cross-head depends a side rod H H, whose lower extremity, together with the ends of the side rods PP, which depend from the cross-tail Q of the connecting rod R, are attached to the end of a side lever GG. To the opposite end of the side levers are attached the side rods N of the air-pump, and on either side of its centre the side rods of the feed and bilge pumps F. The parts not already described are *aa* the slide-valve, C the condenser, E the air-pump, S the crank, U the eccentric, and *uuu* the eccentric rod and valve-gear.

In the engine represented in figs. 3 and 4, the pis-