

## GROUP XVIII.

## Civil Engineering, Public Works, and Architecture.

BUILDING MATERIALS; PROCESSES AND APPARATUS FOR QUARRYING, BRICKMAKING; IRON GIRDER WORK; PREPARATION AND PRESERVATION OF WOOD; ARTIFICIAL STONE, TERRA-COTTA WORK, &c.; MATERIALS AND APPLIANCES FOR FOUNDATIONS (Pile-drivers, Screw-piles, Cofferdams, Caissons, Pneumatic and Diving Apparatus). CONTRIVANCES AND TOOLS FOR EARTH-WORKS (Excavators, Dredging Machines, Apparatus for Raising, Carrying, and Transporting Earth and Materials). MATERIALS AND APPARATUS USED FOR ROADS AND RAILWAYS (Road Rollers; Railway Superstructure, Switches, Crossings, Turn-tables, Traversing-tables, Inclined Planes, Lifts; Pneumatic and other Modes of Propelling; Water Stations and their Apparatus, Railway Station Buildings of all kinds, and Systems of Railway Signals). HYDRAULIC ENGINEERING WORKS, EXCLUDING SEA WORKS (River Works, Canal Works, Dikes, Locks, Dams, &c.) MODELS AND PLANS OF VIADUCTS, BRIDGES, AND AQUEDUCTS, &c. PLANS, MODELS, AND DRAWINGS OF PUBLIC BUILDINGS, DWELLING-HOUSES, BARRACKS, PENITENTIARIES, PRISONS, AND HOSPITALS, SCHOOLS AND THEATRES, LABOURER'S COTTAGES; APPARATUS FOR LIFTING AND MOVING HEAVY WEIGHTS IN BUILDINGS, AS LIFTS, &c.; PLANS AND MODELS OF CHEAP DWELLING-HOUSES; TOOLS AND IMPLEMENTS OF ARTISAN BUILDERS. APPARATUS AND INVENTIONS FOR HEALTH, COMFORT, AND CONVENIENCE IN BUILDINGS (for Lighting, Water Supply, Drainage, Waterclosets, Lightning Conductors, &c.) AGRICULTURAL ENGINEERING; PLANS FOR CULTURE, FENCING, DRAINING; FARM BUILDINGS; BUILDINGS FOR CATTLE BREEDING; STORES, STABLES, MANURE TANKS, &c. INDUSTRIAL BUILDINGS; SPINNING MILLS, WEAVING MILLS, GRINDING MILLS; DISTILLERIES, BREWERIES, SUGAR MANUFACTORIES; WAREHOUSES, SAW-MILLS, AND DOCKS, &c.

BICKFORD, SMITH & COMPANY, *Tuckingmill, Cornwall*.—Patent Safety Fuses for blasting in mines, quarries, &c. (680)

SIEBE & GORMAN, 5, *Denmark Street, Soho, London*.—Diving Apparatus, from which two Divers may work at different depths from the same Air-Pump. Used by the English Admiralty. (681)

HEINKE & DAVIS, 2, *Brabant Court, Philpot Lane, London*.—Improved Diving Apparatus complete; Electric Lamp for sub-marine uses. (682)

AVELING & PORTER, *Rochester, and 72, Cannon Street, London*.—Steam Road Roller. (484)

SAXBY & FARMER, *Canterbury Road, Kilburn, London*.—Railway Junction Model; Interlocking Railway Points and Signals; Facing Points and Switches; Level Crossing Gates; and other railway security apparatus. (683)

BAINES, WILLIAM, *Railway Plant Works, Birmingham*.—Model of Railway

Locking Switches and Signal Apparatus. (700)

BLAKEBOROUGH, JOSEPH, *Brighouse, Yorkshire*.—Waterworks Appliances, Hydrants, Fire-extinguishing Apparatus, Gun Metal Steam Fittings, Cocks, Gauges, Valves, Steam-whistles, &c. (684)

REDMAN, JOHN B., F.R.G.S., Member of the Institution of Civil Engineers, 25, *Great George Street, Westminster*.—Model of Royal Terrace Pier, at Milton-on-Thames, erected by means of Cast-iron Cylinders, 1843-5—the pioneer of this class of marine construction; principal dimensions in feet—length 250, breadth 30; the cast-iron girders are 50 and 51 ft. long, and 3 ft. deep, and weigh 8 tons; cylinder foundation piers 6 ft. in diameter; their average depth below low water mark at Spring tide, 12 ft., rise of tide 20 ft.; height of structure from base of foundations to vane, 80 ft.; the cylinder foundations are all carried through the alluvial sands and gravels down to the solid chalk; the cylinders are filled solidly with brickwork and concrete in cement, the base stones being held down by central wrought iron through bolts. Drawings of Cylinders