

viaduct is a very heavy cutting of hard material, called samel, containing 152,000 cubic yards. 1 mile further is the Low Gill embankment, containing 170,000 cubic yards, being one of the highest banks in England, reaching nearly 95 feet above the level of the ravine. Next is a very great piece of excavation through blue rock, in extent about 120,000 cubic yards. Of this hard material none of the excavations for some miles northward are altogether clear. We now reach Dillacar Hills. Through one of these hills is a very large cutting, containing 70,000 cubic yards of solid blue rock. The line is here carried over the Borrow Water, near its junction with the Lune, upon a neat viaduct, 63 feet high, and composed of three arches, 45 feet span each. We next arrive at Borrow Bridge, where the gradient begins of 1 in 75, for eight miles in length. Here also is the Borrow Bridge cut, containing 69,500 cubic yards of hard blue rock; the Lune embankment is next, and contains 75,000 cubic yards. It rests on the old bed of the river, which has been diverted from its course. Thirty-four miles from Lancaster is Birbeck embankment, containing 200,000 cubic yards of earthwork, and a viaduct 45 feet in height, the arches being similar to those of Borrow viaduct. The line then passes on to Shap Wells without much difficulty, with the exception of cutting through the Crosby Ravensworth Fells, containing about 65,000 cubic yards of rock and earth. A mile and a half further is Shap Summit, which is 888 feet above the line at Morecombe Bay, and 1,000 feet above the level of the sea; rising 60 feet overhead on each side, are rugged walls of hard rock, presenting a magnificent appearance. This was the most difficult piece of work on the line, and five hundred men were clustered upon it for many months. Upwards of twenty-three tons of gunpowder were used in blasting it. The length of the cutting is about one mile, and the quantity of material excavated 350,000 cubic yards, one-half of which was rock. The formation of it occupied two years. The line now proceeds along the east side of the town of Shap, through a heavy cutting of limestone rock, descending on a gradient of 1 in 125, and passes under a skew bridge at an angle of 45°. The line now pursues its course by Shrimbsby; the ground at this point, being precipitous, has caused a succession of heavy works, viz., the Hackthope cutting, containing 140,000 cubic yards; the Clifton embankment, 200,000 cubic yards, and the Lowther embankment, 270,000 cubic yards. At this point (Clifton), in the course of excavation, a Roman altar, in a high state of preservation, and inscribed to Jupiter, was dug up. This relic of antiquity is now in the possession of George Mould, Esq. We now cross the river Lowther on a large and handsome viaduct, consisting of six arches of sixty feet span. The piers are eight feet thick at the springing, and increase to 17 feet 6 inches at the base; its total length 500 feet. On the north side is a large cutting through clay, containing 275,000 cubic yards. A mile and a half from Lowther the line crosses on a viaduct of some beauty, consisting of five semi-circular arches, 30 feet span each. Its height is 70 feet, and its extreme length 300 feet. We now reach a large cutting, containing 180,000 cubic yards. From Penrith the line runs straight and level on the west side of the turnpike road. Crossing the road, it enters the valley of Pettrill, through which it pursues an almost direct course to Carlisle: the first inclination in this valley is 1 in 184, making a fall from Shap of 500 feet. We then enter a cutting a mile and a half long, 30 feet deep, containing 250,000 cubic yards. Then commences another incline of 1 in 169 for 2½ miles, which makes a fall from Shap 575 feet. An average fall of 1 in 200, with gentle curves, brings us to Wreay, where much difficulty has been experienced from frequent slips. The Wreay cutting is situated on the east side of the village, a mile long, 45 feet deep, in the deepest point; the quantity of earth work amounts to 410,000 cubic yards. The line passes Upperby on the east, joining the Newcastle and Carlisle Railway at the London road station. From Upperby the gradient is 1 in 140; at Carlisle the level of the rail is 36 feet above the rail at Morecombe Bay, and 852 feet below Shap summit. Besides

the principal viaducts mentioned, the works on the line comprise fifteen turnpike road bridges, sixty-four public road bridges, eighty-six occupation bridges, and sixty level crossings.

NEW WORKS IN WOOLWICH

THE new marine barracks, forming an extensive range of substantial buildings, are now nearly completed. These are to afford accommodation for 1,000 men, and form three sides of a square in plan. Brick and stone dressings are the materials of the outside; iron girders and brick arches separate the stories; asphalt forms the floors, and the whole is fire-proof. Ventilation is effected by a revolving fan worked by weights. In front of the main building an arcade, two stories in height, is formed by square brick piers and arches, affording spacious covered walking places, with room for six abreast. Messrs. Rigby are the builders, under the government officers.

The number of new barracks now in course of construction, can scarcely fail to excite attention. Those in the Tower of London, at Bristol, at Birmingham, and elsewhere, have already been mentioned by us. The way in which the designs for these structures are obtained, and information as to the gentlemen who take the credit or discredit of them (as architectural works), may afford matter for some remarks on another occasion.

Very extensive improvements are contemplated in the lower part of Woolwich, where many houses are to be pulled down, and a spacious new street formed.

The new church (designed by Mr. F. Fowler), has been finished for some time, but is not yet opened; an objection which the official referees have thought it their duty to make, has caused the delay. The tower is left incomplete till fresh funds are provided.

In the old church, a stained glass window by Mr. G. Hoadley, from a drawing by Mr. Corbould, has been recently put up. It illustrates the line, "and he bearing his cross, went forth." The figure of our Saviour is seven feet high, and is painted in the modern style, to accord with the character of the church. The border around the window is formed of the passion flower, and a conventional scroll entwined; and in our opinion, somewhat militates against the general effect.

The Roman Catholic Church by Mr. Pugin (who, by the way, is very ill), is probably already known to our readers; as well as Mr. Donaldson's "Scotch Church," which closely adjoins it.

RAILWAY JOTTINGS.

A "Law Reformer," a correspondent of the *Times*, on the subject of the "liability of committee-men," while advertising to the fact that without joint-stock companies we should have had neither canals nor railroads, gas-light nor supply of water, life insurances nor joint-stock banks; splendid club-houses nor any, indeed, of those magnificent results of joint-stock contributions which make England the wonder and envy of the world; with great good sense and ability points to and deploras the clear and inevitable sequence of cause and effect whereby the present state of the law, by rendering even non-acting committee-men or non-acting directors subject, by the acts of partners or agents, to liabilities, in any case whatever, to any unknown amount, and even to the utter ruin of themselves and families, not only discourages the establishment of joint-stock unions of fixed, limited means, in which men of capital might risk a definite sum of money and nothing more; but, by means of such discouragement, inevitably tends to throw existing establishments out of the hands of responsible and prudent capitalists altogether, into the exclusive management of either knaves with nothing to lose, or fools, with immense risk of losing all that they possess. The sooner such a state of the law as this is put an end to, of course, he thinks, the better; and surely it would be wise to remove these ridiculous impediments to the employment of capital at home. We have all a little to risk. Why should we not be allowed to judge for ourselves how much we will risk? Creditors of companies can always be safe, for they never need trust, and it is much better they should not:

for companies requiring such aid must be bubble companies, which would thus at once be burst. "To encourage the employment of capital is to better the condition of the labourer and the artisan."—The labour for railways already sanctioned, but not formed, according to calculations announced on Wednesday week by Mr. Houldsworth, chairman of the Manchester and Leeds line, will require the employment of 500,000 men for ten years, supposing that this number can be withdrawn from the general labour market of the country. It is the maximum that can be withdrawn. The maximum cost of the railways now in course of formation, or for which Acts have been got, in Great Britain, he estimated at 200,000,000*l.*, of which 160,000,000*l.* will have to be expended on those in England; and of this 160,000,000*l.* the sum of 120,000,000*l.* will be spent for labour.—The *Simeron Gazette* assures us that a new engine of Mr. Stephenson's lately "did" the express train business on the London and North Western, between Birmingham and Wolverton, 60½ miles, in 64 minutes, including stoppages—upwards of a mile a minute, in fact. The gradients are an ascending plane of some length at starting, and then ascending and descending gradients of 16 feet in the mile for the rest of the distance. The London and North Western Company, it is said, are determined to sustain this speed, and so come up to the Great Western standard.—Fears are reasonably entertained that the cutting of the tunnel on the railway from Ipswich to Woodbridge, which penetrates through the hills north of the town, may injure or withdraw the supply of water to the town.—The Cambridge station is likely to be another of those "largest ones in England" which are getting rather rife of late. The arcade is to be 410 feet long.—The Stour Valley Extension branch line from Bury to Lavenham, for which the plans are deposited, would pass over a viaduct 370 yards long, west of Sicklemer's toll-gate, cross the Ipswich road, and proceed along the vine fields to Eastgate-street, crossing it by an arch of 45 feet span and 20 feet in height, towards the Ipswich and Bury line. It will be stoutly opposed, however, by landowners.—The Cheltenham General Hospital and Dispensary has been purchased by the Cheltenham and Oxford, at cost price, for the purposes of their works, on condition that they provide an extended building on an improved site. The Grammar School, too, it appears from the deposited plans, will be required, and another, and probably also extended building, erected in its place.

NOTES IN THE PROVINCES.

A proposal to preserve and restore the old Grammar School at Ipswich, the last relic of its ancient and numerous monastic institutions, has been rejected by the corporation, many of whom, strange to say, are nevertheless members of the Archaeological Association. This interesting relic was originally the refectory of the Dominican friars, and very ornamental in character, and is still in comparatively good general preservation, with its black oak roof defaced with many a coat of whitewash certainly, but exhibiting, nevertheless, many traces of its ancient ornamental painting.—A memorial, or sea-mark, in honour of the late Earl of Yarborough, is to be erected in the Isle of Wight. The subscriptions now amount to upwards of 600*l.*—The repair and re-pewing of Trowbridge church, Wilts, is talked of.—Government is about to be applied to for permission to erect a custom-house at Birkenhead, to be forthwith commenced.—Two extensive rice-mills are in course of erection at Liverpool, where rice is being ground at a great rate, day and night, in eight other like establishments, in consequence of the failure of the potato crop. A thriving trade is at present done here in the importation of paving-stones from the Isle of Man. The council have organized a regular sanitary staff, under the new Act, which comes into operation tomorrow (1st January, 1847). The provisions of this new leaf which is to be turned along with the in-coming year, seem to be no less beneficial and excellent than stringent and peremptory. The smoke from furnaces, steam-engines, bakeries, &c., from every steamer plying on the Mersey, every steamer