ages, though these cannot be expected to bear any close comparison with the productions of more intelligent artists, and especially the famous bridge which Telford constructed across the Menai Straits, to connect the Isle of Anglesea with the coast of Wales, and which at the time of its being completed (1826) was the largest of the kind in the world. The span of the suspended or central arch, between the highest points of the chains on the tops of the piers, and 153 feet above high water in the straits, is 560 feet, and the versed sine or depression in the middle is forty-three feet. Seven stone arches, of 521/2 feet span each, make up the rest of the bridge ; four of those being next the island, and three on the Welsh coast. But the chains, of which there are sixteen, reach over the whole structure, and, besides, descend sixty feet in sloping pits or shafts, to where they are secured by means of cast-iron frames ingrafted in the rocks ; the entire length of each chain being 1714 feet, or almost one third of a mile. The two suspension piers of the middle arch rise fifty-two feet above the roadway, and are surmounted by cast-iron blocks and saddles, moveable upon friction-rollers, for the purpose of allowing the chains which pass over them to move with freedom when expanding or contracting under the vicis­situdes of temperature. The suspended platform, elevated 100 feet above high water, is occupied by two carriage-roads, each twelve feet wide, with a footpath of four feet between them. These pass through arches in the suspension piers ; and each is separated and strongly railed in by lattice iron­work, both for protection, and also for stiffening the road­way to prevent vibration. Each of the chains is fivefold, being composed of five series of iron bars, in such a man­ner that there are eighty bars in the cross section of the whole chains. Each bar is nine feet nine inches in length, three inches in breadth, and one in thickness, with six con­necting plates at each double joint, eighteen inches long by ten broad, and one thick ; the whole being secured by two bolts of fifty-six pounds each. The design of such com­plexity is, that any part of the chain may with safety be removed at any time for repair, or be replaced by a new one.

The Menai Bridge, however, has been greatly surpassed, both in length and height, by a far lighter and much less ex­pensive one, though of great strength, which has since been constructed by M. Challey of Lyon, over the river Sarine, at Freyburg, in Switzerland. This was completed in 1834. The span is 870 feet, and the roadway is elevated 167 feet above the water of the Sarine. The lightness of this bridge is in a great measure owing to its neither being suspended by chains nor solid iron rods, but by four cables of iron wire, each containing about 1200 wires, the united strength of which could support thrice the load they will ever be likely to bear, or three times the weight of two rows of loaded waggons extending over its whole length. It is greatly in favour of these cables that the wires have not been twisted together like so much hair or hemp ; for we have no doubt that twisting would have increased the stress in the ratio of radius to the cosine of the obliquity, as it must unavoidably do in ordinary ropes ; but each wire just preserves the same direction as the cable itself does, and which, between the piers, is that of a catenarian curve, depressed fifty-five feet at the middle. Two of the cables are placed close together at each side of the bridge ; each cable, except where it passes in a flattened shape over friction-rollers on the tops of the piers, has the whole of its wires firmly bound into a cylindrical form, by means of annealed wire wound round them at intervals of two or three feet. They are painted white, both for preservation, and that the least tendency to rust might be detected at once. The cables first enter the banks in a sloping direction, and after passing over friction-rollers, and then descending forty-five feet vertically in shafts cut in the rock, they are finally attached at the bot­tom to massy blocks of stone, which are securely held down by means of masonry, filling up the shafts in a dovetailed form.

But the catenarian form of suspension, however well suited to support a heavy load uniformly distributed over it and at rest, is by no means easily restrained from a readi­ness which it naturally has to yield, like a fluid, to any change or inequality in the pressure, and consequently to oscillate or undulate when used for a bridge which has to support loads that are not only very unequal, but perpetually shift­ing their positions on it. To remedy or obviate this defect, various schemes have at different times been proposed. Some of these are merely attempts to stiffen the fabric by means of stays, strongly trussed railings, &c. In other schemes, it has been proposed to abandon the chains and cables altogether, and to use in their stead separate and un ­yielding suspensions for the different parts of the roadway. Thus in the Annals of Philosophy for January 1818, Mr Loudon has given a design for a bridge to cross the Mer­sey at Runcorn, in which the suspension is to be effected by a considerable number of straight iron rods, radiating from the tops of the piers, and separately attached to two series of equidistant points ranging along the roadway. Under this arrangement, it is evident that no material sinking of a particular part of the roadway could occur without the rods which supported it giving way altogether, and it were easy to have these as strong as any chains. Nearly the same scheme was afterwards given by Mr Seaward in the Philosophical Magazine for December 1823, and has been still more recently proposed again, with some improvements, by Mr Curtis, at the Liverpool meeting of the British As­sociation, under the title of “ an inflexible suspension bridge.” At the Newcastle meeting, a scheme was brought forward by Mr Dredge, for what he calls “ a mathematical suspension.” His paper then read has been printed with some additions in the Mechanics Magazine for October 1838; but instead of any thing mathematical, the terms in which he has expressed himself are so enigmatical, if not paradoxical, that, from an attentive perusal, we have only been able to gather, that by means of a tapering chain, and what he calls “ diagonal rods,” he professes (though without explaining how) both to lessen the strain greatly, and also to proportion the strength of the several parts so accurately to the stress, as to require a much less quantity of materials than usual. He farther informs us that a bridge constructed at Bath, on these unexplained principles, has answered ad­mirably. There are various other projects for bridges, which our limits will not permit us to specify. (e. e. e.)

SUSSEX, an English maritime county, bounded on the east by Kent, on the north by that county and Surrey, on ; the west by Hampshire, and on the south by the British Channel. It is of an oblong shape, being about seventy miles in length from east to west, and nowhere more than twenty-six miles in breadth from north to south. Its area is 1463 square miles, or 936,320 statute acres. It is di­vided into six portions, provincially called *rapes,* which are again divided into sixty-five hundreds, and contain 313 parishes. The greater part of the county is within the dio­cese of Chichester ; but the deaneries of Pagham and South Malling, and All-Saints in Chichester, form a part of the peculiar of the archbishop of Canterbury.

The population of this county at the four decennial pe­riods of enumeration amounted, in 1801 to 59,311, in 1811 to 190,083, in 1821 to 233,019, and in 1831 to 272,800.

At the last period the distribution of the inhabitants was, Occupiers of land employing labourers 3,160

Occupiers not employing labourers 1,330

Labourers employed in agriculture 26,125

Labourers employed in manufactures 109

Labourers in retail trade and handicraft. 19,208

Capitalists, bankers, &c 3,094

Labourers not agricultural 8,151