

THE COMMERCIAL POWER OF GREAT BRITAIN;
EXHIBITING A COMPLETE VIEW OF THE PUBLIC WORKS
OF THIS COUNTRY

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Let us now place ourselves at the lowest point of the second line of the Ellesmere canal, that is to say at Shrewsbury on the Severn; ten miles and a half of canal are still wanting to complete this line. Following it, we ascend first 134 feet, on an extent of one mile and three-quarters, then we proceed fourteen miles and a quarter on one level; we ascend thirty feet by the four locks of Frankton, which are near the crossing of the two great lines of the canal; three miles farther, we again ascend thirteen feet by two locks; all the rest of the canal is on a level. This last part is fourteen miles and a quarter in length; it is the most interesting of all on account of its beautiful works: in this short space, it presents the stone aqueduct erected at Chirk to cross the Ceiriog, then two tunnels, afterwards an aqueduct of iron to cross the Dee at Pontcysyllte. Beyond this aqueduct, the canal is parallel to the river, and hollowed in the rock, for a great portion of its length, as far as Llantisilio, above Llangollen.

Between Pontcysyllte and Llantisilio, a great iron rail-road was to be extended by a new ramification of the canal, in ascending, on one hand, to the county of Flint, and descending, on the other, to the left bank of the Dee, as far as Chester. By this means, the communications from that city with the upper part of the counties of Flint and Denbigh would be much shortened. This project will doubtless be one day executed.

At Llantisilio, the Dee has a dam of stone and sluices to feed the canal, which supply is obtained in great abundance, because the Dee, above Llantisilio, receives the waters of very spacious and deep valleys, and those of Bala Lake, the length of which is above three miles and a half. A regulating dam economises the water of the lake, so that they may suffice for the supply of the canal, even during the longest droughts. In short, this supply is the more advantageous, that it furnishes, from the most elevated points, the necessary water to three branches of the Ellesmere canal; those of the north, east, and south.

So vast a combination of inland navigation, by procuring outlets for the territorial produce of the counties of Flint, Denbigh, Montgomery, Shropshire, and Cheshire, is an immense advantage to the numerous valleys, whose agricultural produce and manufactures it conveys. To these must be added the produce of the mines of salt, iron, and zinc, and of the quarries of slate, lime, marle, etc, with which the counties just named abound. We shall then have an idea of the riches which, thanks to the communications opened by the Ellesmere canal, are conveyed, according to the speculations of the merchants; first, by the Mersey, to Liverpool, Ireland, Manchester, and the north of England. Second, by the Severn, to Bristol and to the south. Third, and last, by various canals to London and all the eastern part of Great Britain.

The Ellesmere canal is perhaps the only example that can be produced in the three kingdoms, of a system of canals, combined in this manner for the special wants of the works

in the mines, and of agriculture, while the supply of the manufactories and towns is an object of secondary importance; hence, the principal landholders of the valleys with which the canal of Ellesmere now opens a communication, were the persons who, as early as 1792, formed the company to which this noble enterprise owes its origin. This is an example which should especially interest the provinces in the centre of France, the landholders in which may acquire an entirely new source of territorial riches, by combining a similar system of internal communication for the disposal of their agricultural produce.

The Ellesmere canal, so remarkable for its object and extent, is no less so for the beauty of several works of art, the merit of which we were the first to make known to the engineers of the Continent*. It must claim the attention of scientific men on account of the two aqueduct-bridges which it has been necessary to erect, that of Chirk, built of stone, and especially that of Pont-y-Cyssylltan, which is of iron.

The canal bridge of Chirk is composed of ten arches; it is 500 feet in length, between the butments, which extend fifty feet on each side; this makes its total length, six hundred feet: its elevation above the Dee at high water is equal to sixty-five feet and a half. The breadth of the canal on the aqueduct is twelve feet, not including a towing-path, as may be seen in the plate, in which we have represented this aqueduct.

Setting out from Chirk, we pass under the first tunnel, 500 yards in length; the canal runs then in the open air, by means of a deep cut, one mile in length. The second tunnel is 600 feet in length, and opens into the valley of Dee, which the canal crosses at Pontcysyllte.

In this place is a bar, which is drawn across the canal when it is necessary to stop the navigation. When it is free, this bar is received in a chamber, or deep recess, of equal dimensions, cut in the bank of the canal; a capstan is used to draw it in and out of its recess: this bar, which is of wood, is made to run and to fit in a groove at the bottom of the canal, and on the opposite bank.

In 1795, Mr. Telford, who was intrusted with the direction of the Ellesmere canal, conceived the idea of substituting iron for the coating of clay with which the English line their aqueduct bridges. He first tried this at Chirk, as a prelude to the beautiful construction of Pont-y-Cyssylltan; above the arches of the aqueduct of Chirk he built side walls with brick, in the usual manner, but with stone coating. Between these walls he laid down large plates of cast-iron, for the bottom of the canal, carefully clamped, then fastened with iron pins, screwed and caulked in the joints; these plates serve at the same time as continued holdfasts, in order to prevent the side walls from being thrown outwards by the pressure of the fluid.

The works necessary for erecting the aqueduct of Pontcysyllte were attended with much more difficulty; it was requisite to execute the canal at a height of $126\frac{1}{2}$ feet above the surface of the river, at a place where access was had by a causeway 500 yards long, seventy-six feet and a half high, and forty-two feet broad at the top; it was found by calculation that it was more advisable to erect a canal bridge 1010 feet in length, than to carry this immense causeway any further. To execute this bold enterprise, Mr. Telford resolved to make still more use of iron than in the works at Chirk; he erected nineteen metal arches on eighteen piles of brick, to two butments of stone. This aqueduct alone cost fifty-four thousand pounds sterling.

The arches represent two segments of a circle, each formed by four ribs of cast-iron, which are open in order to be lighter; the open parts have the appearance of the stones composing a stone arch, while the bars, or solid parts, may be said to represent the arras of such stones.

To give to the structure a greater power of resistance against the pressure of the water, the sides of the canal are composed of strong plates of wrought iron, not cut straight, but so formed as if they were a continuation of the lines presented by the solid parts of the-ribs of the bridge ; and the plates which join the parts of one arch with those of another are wider at the bottom than at the top, which produces the same effect as that of buttresses supporting a wall.

The towing path is a little above the surface of the water, within the aqueduct; it is composed of pieces of timber lying transversely, and resting upon the heads of posts or muntins, which are equidistant. These posts are upon two rows; one is close to one of the sides of the aqueduct; the other under that edge of the towing path nearest to the middle of the canal. Strong beams go from one post to the other, and are secured by braces placed diagonally between the opposite posts; thick planes, closely joined together, rest upon these beams, and finally a layer of gravel, well bound together, covers this wooden platform: the object of this gravel is not only intended to preserve the floor from the injury it would receive from the horses' shoes, but likewise to prevent the shaking which these animals would occasion in treading heavily over an elastic surface; this shaking would be sufficient to disjoin rapidly all the parts of this *bridge canal*. An iron railing, about three feet high, runs along the exterior hedge of the towing path, and serves the purpose of a parapet.

Such is the aqueduct of Pontcysyllte, which for its lightness, simplicity, and elegance is a model of its kind.

Near this aqueduct, ascending the left bank of the Dee, there are several basins to receive the boats that come to take in their cargoes, which chiefly consist of iron and coal. Most of the piles of the aqueduct rest upon layers of coal.

The valley of Llangollen, in the midst of which this monument of art is erected, is very striking in its appearance. I have endeavoured to give an idea of it in the short narrative of my second journey, as follows:—

" From Chester I went to Wales, to visit the works of the Ellesmere canal; the most important, in my opinion, was the aqueduct of Pont-y-Cyssylltan, thrown over the torrent-like river which flows through the valley of Llangollen. At the height of 127 feet, and for a length of 1000 feet, you see an aerial canal, the metallic envelope of which is supported by bold and light piles. Boats heavily laden, and the horses which tow them, securely pass over this road, hanging over an abyss, and carrying to Ellesmere the coal, the lime, and the iron furnished by the mines, the quarries, and the forges of the vale of Llangollen.

" After a long and fatiguing walk, I entered the valley on a fine autumnal evening, almost at the moment of sunset; never did a more magnificent scene burst upon my sight, in the midst of a vigorous vegetation, still retaining all its freshness: columns of smoke and flame; perpetual eruptions from the craters of industry; furnaces, forges, limekilns, and heaps of coal ignited to become, by the very operation of ignition, a perfect combustible; manufactories, country-houses, and villages, placed in the form of an amphitheatre, on the sides of the valley; below, a rapid torrent; above, the canal bridge, placed, as if by

enchantment, on lofty and slender pillars of an elegant and simple construction; and this magnificent work, the fruit of the happy and bold efforts of one of my friends! Lost in the contemplation of these beauties of art and nature, which by the fading away of the declining light, changed their appearance every moment, I stood as it were in ecstasy, till the close of twilight obliged me to retire, and seek an asylum at some miles' distance. This is what I have seen, but which I cannot describe without depriving it of the charms of reality, and which nevertheless, in spite of time and distance, still makes my heart beat at the recollection of the emotions which this magnificent scene excited in me."—(*Memoires on the Marine Bridges and Highroads of France and England.*)