

versely, as their distance from the vertical line passing through the centre of gravity of that portion. If that vertical cut CG at Q , and we call CQ , a , and CG , b , then the whole weight is to the part resting on C , as $b : b - a$, and the whole weight to the pressure at D , as $b . a$. Now the pressure at C acts merely to keep down the abutment, and that by a leverage LC ; but the pressure at D produces a different effect, and one that must be carefully attended to. Draw CD and DG , and call DG , e , and CD , d , for brevity. The two half-arches press together at D , and mutually sustain each other. Let the pressure on one side be represented by DG (e), and let it be considered separately, and apart from the other side, (e) may be decomposed into an oblique thrust (d), and a horizontal action (b), which last acts towards G , and tends to crush the stones at the key, and is met and resisted by the strength of the stone, strongly confined between the pressure (b) and its equal and opposite pressure (b'), so that we have only to consider the oblique action (d) which evidently bears from (D) towards (C), and partly tends to press (C) horizontally, and partly to keep it down vertically, and this is to be added in part to the resisting forces; and in proportion as (CD) is more nearly horizontal, so much the more powerfully it presses (C) horizontally, and *vice-versa*; as it is more vertical the more does it tend, as in Gothic arches, to weigh down the abutments and keep them steady. It is, moreover, the oblique pressure which this part of the arch exercises, which squeezes the arch-stones so tight together between the crown (D) and the point of rupture (C), as to make them act as one homogeneous mass, or stone, whose individual parts cannot slip out, even though they should not be shaped as wedges.

The former notion, about the arch being perfectly equilibrated by a catenarian curve, is now regarded as a fallacy,*

* We agree with the writer, when the catenarian curve is taken as the intrados, but when it is used to determine the direction of the joints, and the latter are made perpendicular to it, we regard it as any thing but a fallacy. With as much propriety might the practice of building a vertical wall with horizontal courses, that is, with beds perpendicular to the line of direction of the pressures, be regarded as a fallacy