as before using the weights given for the several nodes of the arch, to determine the points \(c', d', \&c\). These being connected by straight lines, we have an equilibrated arch adapted to the given distribution of load.

LXXIII. But of course, this arch will not stand under any other disposition of the load. To obviate this difficulty, and to construct an arch which will stand under a variable load, without the chord and counter-bracing of the arch truss, the device has been adopted, of constructing the arch of such vertical width that all the equilibrated arches or curves, required by all possible distributions of load; may be embraced within the width of the arched rib. Then, if there be sufficient material to oppose and withstand the forces liable to act in the lines of said several equilibrated curves, complete vertical stability must result.

The proper width, or depth of the arched rib, will depend upon the length and versed sine of the arch, as well as the amount and distribution of load; and the material will act most efficiently, when mostly disposed in the outer and inner edges, or members of the rib, and connected, either by a full, or an open web, to distribute the action between the outer and inner members, according as the resultant line of action approaches the one or the other of those members.

The normal form of the arch should be such as to be in equilibrio under a uniform load,* and hence it will be parabolic, as to the movable load, and the weight of road-way, and catenarian, as to the weight

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* The method above explained, for describing an equilibrated arch, is applicable to all cases where the load, both constant and variable acting on the several parts of the arch, is known, whether it be the normal curve, adapted to a full load, or a distorted curve, suited to an irregular distribution of load.