An exchange says: "The Niagara Suspension Bridge, which connects the New York Central and Great Western railways over Niagara river, has been for months past undergoing improvement It has been thoroughly inspected, with a purpose to discover the condition of its anchorage and concealed parts. Everything was found to be as perfect as when laid twenty years ago. The entire wood work has been replaced with new, and there is nothing about the bridge which is not just as perfect as on the day it was first completed. A strong new cord has been put under the carriage way of the bridge and the one above has been rebuilt. Engineers declare that the bridge could not fall if the cables were wholly removed The popular idea has been that the whole weight of the structure depended on the cables. Those cables that have so long supported a bridge full of loaded cars without flinching will no doubt long continue to do all that is required of them.

Education and the Brain.—M le Dr. Broca, in a long dissertation published in the *Revue Scientifique*, takes the ground that education is reflected in brain development. He concludes as follows: "It is this influence of education upon the brain which I have sought to determine, and I think I have demonstrated that cultivation of the mind and the exercise of intellectual labour augment the volume of the brain, and that the increase is principally upon the frontal lobes, which are the seat of the most elevated faculties of the intelligence. Education not only makes man himself better; it not only gives him that superiority, relatively to what he would be without it, which enables him to use all the intelligence with which nature has endowed him; it even transforms him, and renders him, as it were, superior to himself, by increasing the volume and perfecting the forms of the brain Those who call for universal instruction justify their demand upon grounds both social and national. We may now invoke an interest, perhaps, still higher—that of the *race* To diffuse instruction is to improve the race. Society can do it, and it is the highest duty."

FUSION OF PLATINUM.

The following arrangement of a furnace enables us to effect this fusion easily, and to produce a temperature which may be useful both in research and in practice. In a saltpetre refinery at Lille there is a large chimney, 30 metres high and one-fifth metre in diameter. It serves for a vent to eight large steam-boiler furnaces, fed with coal, and which maintain a constant and energetic draught. A small door, opening into the base of the chimney, and generally closed by a small brick wall, communicates with the interior. Before this door, at the foot of the chimney, a small wind-furnace is constructed, of which the outside bulk does not exceed a cubic metre The grate, of movable iron bars, is a square of 0 30 metre. The capacity of fire-box is 45 litres, and the flue communicating with the interior of the chimney is one-fifth of a metre in width. The first experiments were made with coke as fuel Parisian and Hessian crucibles were tried, as well as those of black-lead and lime, and in each were placed, to try the heat, about 50 grammes of iron nails. The operation lasted scarcely an hour; the combustion was very active, the draught roared loudly, and the light of the fire was dazzling. In every case, crucible and metal were fused together, leaving on the bars a vitreous slag. Coke was replaced with gas-coke, in the hope of obtaining a more moderate action. The phenomena were the same, but even more intense. The best result was obtained by cutting a piece of gas-coke into the shape of a crucible, and placing it within a Hessian crucible. In this 50 grammes of platinum were placed, partly in the spongy state and partly in clippings. After the fire had been maintained for an hour, a button of platinum was obtained, perfectly fused, and weighing 50 grammes.

The experiment of Ebelmen was repeated, who obtained crystalline alumina, by heating in a porcelain furnace a mixture of alumina and borax After the borax was volatilised the interior of the crucible was covered with a layer of small hard crystals of alumina, translucid and very brilliant.

PROPOSED CENTENNIAL EXPOSITION BUILDING, PHILADELPHIA.

To obtain the best building, or set of buildings, for the Exposition proposed to be held in Philadelphia in 1876, a competition was invited, and forty-three designs were sent in. From these ten were selected, the designers of each being permitted to revise and alter the details, and having for this purpose access to all the others. There was then a second competition of the revised designs, from which the successful plan was chosen. This design is by our countrymen, Mr. Calvert Vaux, and Mr. G. K Radford, somewhat modified, we believe, by details taken from a design furnished by Messrs. Sims & Brother, of Philadelphia.

We have engraved a view of the interior of the building and the plan, as originally sent, and which it will be seen is novel in construction. We will let the designers speak for themselves.

Although several large structures are to be erected in connexion with the proposed scheme for the International Exhibition in 1876, it was evident that the problem to be first solved was the plan for the main temporary building, and to that they mainly confined themselves.

The schedule of instructions clearly recognised the advantages to be gained by providing for the various groups of exhibits in concentric zones, as in the last Paris building.

The present study in its floor plan is based on a zone arrangement, with square instead of rounded ends, it being contended that this corresponds with the facts better than the circular plan, as the angles give to the nations that require it a greater proportional increase of exhibition space in the departments, illustrating the results of high civilisation. It has, on the other hand, the main element of the Vienna plan in its twelve interior open courts, which have been designed with the idea of making them as small as practicable, but are 60 ft. in diameter; and essential features in reference to the light and air of the building, and the discharge of water from its roof.

The delivery and distribution of goods was difficult and tedious in the Paris building, as its mode of construction did not allow of access by railroad cars to all parts of the interior. This is proposed to be remedied in the present instance,—direct communications being provided for throughout the building, on three lines of double-track railroad.

In the Paris building no general interior effect was attempted, and no special emphasis was possible anywhere, so that the impressions of the visitor in regard to position were easily confused, and the interminable circular line prevented vista effects of any greater length than about one-third of the short diameter.

In the Vienna building the nave and transept arrangement, which includes all the proposed exhibition-room, was not depended on to produce any sufficiently satisfactory general effect, and a central dome, 333 ft. in diameter, was erected of permanent materials, to give an adequately grand impression In the present study the aim has been to make the temporary building itself furnish the elements of a spacious and impressive design, that shall be equal in desirability for exhibition purposes in every part.

Instead of one detached dome with a span of 333 ft, the present design is made up of twenty-one domed or vaulted pavilions, each 240 ft. in diameter, clustered together, and connected by arches of 150 ft. opening, and fountain-courts 60 ft in diameter. The various parts of the building are thus included in one grand whole, and the result becomes a spacious hall, adequate to the emergencies of the occasion. with long vistas, central and intermediate points of emphasis, direct lines of transit throughout its length and breadth, diagonal lines of communication where really needed, and an entire relief from any appearance of contraction anywhere. for the visitor is always in an apartment over 200 ft. wide, that opens without any intermediate corridor into other apartments, also over 200 ft. wide. This result is obtained by employing semi-circular roof-trusses, springing from the ground-level.

The difficulty ordinarily experienced in this method of construction, is that a long stretch of roof is liable to be blown over while in progress of erection, even where moderate spans are used, because the design does not include provision for lateral support or stay. In the present plan this difficulty is avoided; for the principal trusses used in the construction of