Right Hon. W. E. Gladstone. An hour later it becomes a clear outline of the late Sir John Macdonald's profile, and then, as if to render impossible any accusation of partisanship in Canadian politics, the shade finally transforms itself into a silhonette of Sir Wilfred Laurier's features." This discovery should lead those who have hitherto regarded these buildings as a pile of uninteresting ugliness to study them more closely in order to find the features of interest which the architect in his wisdom did not think advisable to make plain to the eyes of persons who look only on the surface of things.

PROPORTIONS OF WINDOWS.

Proportions of window openings and interspaces of openings and their architraves must in practice materially depend upon necessity, and, moreover, it may be remarked that even where windows have only the same space as themselves between them, the same idea of breadth and strength which more than double their width between them gives may be gained by extra height between their heads and the cills of the next floor openings, and though we owe much to the investigators on proportion as to the effect of inter-widths, we have no data about inter-heights, which, for a noble appearance in a building, should be as great as is usually possible. As to the proportion of architraves being not less than a sixth or more than a fifth of the void, it is difficult to conceive on what ground it is asserted. Many most excellent openings, even in Italian architecture, are more ; the gate of Ghiberti at Florence, for instance. In other styles it would be useless to particularize what should be the general rule. Not that from this it is to be inferred that in Classical art these rules of proportion can be harmlessly played with by everyone. Rules of whatever kind are most valuable when not meant to repress design, and as a starting-point from which we may see how we can effect improvement; indeed, though they have had the effect of making architecture a commonplace business, executed by commonplace men, yet to one who has been tossed about in the uncertainty of original design, they are like terra firma to his unsteady footing. These rules of proportion especially are most difficult and most valuable, and that they have been departed from at times with great success is no depreciation of their use for the ordinary practitioner ; those deviations were effected by men of great genius, guided by study.

LIGHTNING CONDUCTORS AT ST. PAUL'S.

Mr. John Faulkner, of Manchester, has written to give the history of the lightning conductors at St. Paul's. For about sixty years after Wren's cathedral was completed there were no lightning conductors of any sort, and the new building was liable to suffer in thunderstorms—just as its predecessor had been liable and had suffered before it. In 1769 a committee of the Royal Society took the matter in hand, and under their recommendation the metal work of the lantern was connected to the lead of the dome by means of strips of lead and one and a quarter inch square iron bars, the lower portion of the dome's lead roof being connected to the down spouts on the stone gallery, and so to the down spouts of the roof of the nave, and ultimately with the ground, into which the lead down spouts pierced for three feet, a distance considered to be sufficient to carry away any electricity collecting on the building. The pine-apples on the summits of the western towers were similarly connected to the ground by way of the nave roof. In 1873 these arrangements were examined, and it was found that not only had the iron rods rusted so as to be in themselves a positive source of danger, but that in many cases the old iron hoods of the rain pipes, which hoods had originally acted as the connection between the rods and the pipes themselves, had been exchanged for granite hoods six or eight inches thick, through which the electric discharge was left to pierce. Upon this state of affairs becoming known, the dean and chapter appointed Mr. Faulkner to provide efficient protection against lightning, with the result that the top of the cross surmounting the dome and the tops of the pine-apples on the western towers were then connected with the sewers in a manner believed to be capable of thoroughly protecting the cathedral from any peril by lightning whatsoever. Mr. Faulkner says that he knows of no building in London which was protected against lightning by a system of conductors prior to 1769, when, as above shown, the cathedral conductors were first erected.

THE EXPANSION AND CONTRACTION OF A BRICK.

Considering the great importance of the changes in volume of a brick, which result from variations in temperature both during the manufacture and the subsequent use of the brick, it may be interesting, says the British Clayworker, to briefly discuss the subject of contraction and expansion. And in connection therewith it will be especially worth our while to point out definitely the difference between the true contraction of a body and an apparent contraction which sometimes takes place.

Let us begin with a wet brick, that is to say, a mass of particles of clay, amongst which is contained a good deal of water. This water is contained in one and the same brick in two distinct ways :—(1) Some of it is simply mechanically included amongst the solid particles, i.e., in the pores and other cavities which are always found in solid bodies. This water is usually termed "hygroscopic water." (2) Some of it is contained in chemical combination with various of the substances in the brick, and is termed "water of combination."

Let us now heat this wet brick. For a time the total volume of the brick will decrease, and yet not one of the chemical substances usually found in bricks contracts when heated. This apparent contraction of the brick is due simply to the loss of its hygroscopic water. For, as the water is expelled, the clay particles will necessarily be brought into closer contact, hence the shrinking ; and accordingly the water which is lost in this way during the first part of the heating is called "water of shrinkage."

Let us now suppose that all this water of shrinkage has been expelled. There is water in the brick still. For although the clay particles are now in as close contact as possible, there are pores which still contain water, and this "water of porosity" will be expelled by further heating. But during this stage of the process a slight expansion of the brick takes place, for, although it is losing water, the clay particles do not come any nearer each other, and each individual particle is expanding.

The brick has now lost all its water of shrinkage and water of porosity, but there is water in the brick still,