

must not linger longer upon it but pass on now to architecture in its relation to painting.

As we found that sculpture began in the most primitive manner, so painting had a humble origin also. Just as a child will scrawl on a slate, rude forms intended to be imitative, or traced with a charred stick on a wall something which may bear a distance resemblance to a cow or a horse, so the child of the ages essays in pictorial art decoration were of the rudest. Soon however rapid progress was made, not only as a style of decoration, but also as a medium for the expression of his thoughts and wishes, and much of Egyptian decoration is but his language in symbol.

The Assyrians also wrote their history on their walls not only by sculpture but by painting, and we have examples of this in which the colours are fresh to this day, affording in common with their sculpture valuable assistance to historical research.

In the buried cities of Herculanean and Pompei have been found many evidences of internal pictorial decorations not always of an exalted or an ennobling order, but throwing much light on the manners and customs, the thought, the morals, and the culture of the inhabitants.

But it is in their architecture that we find painting laid most under contribution to heighten architectural effects, and these are of surpassing interest. Some of the earliest examples we have are in the catacombs, very rude but pathetic in the story they tell of heroic faith kept alive under most bitter and unrelenting persecution in those underground cells and passages.

But when Christianity was not only tolerated but patronized by the civil powers, as they grew in power and wealth, their pictorial art expanded into more ambitious channels and more enduring mediums. Working on the Roman method of mosaic work, they adopted glass mosaic largely, and in this material they portrayed often in ludicrous, but always in original and vigorous form, the incidents and virtues of the Christian faith, and with these they lined the walls of their churches, so that they were ever surrounded with Scripture story.

The old town of Ravenna, in Italy, contains more of these than almost any other town, and in the Baptistery especially, the dome of which is completely lined with Scripture subjects relating to Baptism, in mosaic, the custom was not only useful but the result was also very beautiful.

In the Baptistery at Florence we have also similarly beautiful work; and in the famous and well-known church of St. Marks in Venice, we have mosaics outside and in,—covering walls, roof, dome and floor mellowed down to a beautiful tone by time and the incense of ages, and giving a soft harmonious result that needs to be seen to be understood.

But there was a shepherd boy tending sheep on an Italian slope, who, to wile away the time, took to sketching his sheep on a smooth slaty stone. Cimabue at that time a well known painter, happening to pass that way noticed the boy and seeing him busy at his drawing detected the genius in embryo, which was later on to make him famous, took him from the sheep folds and trained him in his own studio. As has happened often since, the pupil eclipsed his master and Giotto introduced a new era in painting. His masterpieces are not found in any picture galleries, but are

frescoed on the walls of the Arena Chapel at Padua, in Santa Maria Novello at Florence, and elsewhere. There in their magnificent framework, they add charm to the building, and derive beauty from it. These pictures are a series depicting the lives of some of the saints and are most exquisite in their thoughtfulness, their delicacy and yet firmness of touch and their beauty and harmony of color. Then oil painting was unknown, and these are done as fresco work in distemper, and are much more suited to the decoration of a building with their quiet flat tone than oil painting with its glossy, shining surface distorting and reflecting the light.

Others followed in his footsteps and we soon find in quiet chapels and cool cloisters and shady corners, sweet faces and lovely forms looking down on us from these frescoed walls, all over Italy. But I must not forget to mention the saintly Fra Angelico—the angelical painter, who was so devout that it was reported he painted on his knees. He has left behind him in the Convent of San Marco at Florence, so identified with the great lion-hearted Reformer Savonarola,—memorials of his piety, his devotion, and of his genius such as any one might envy. On the end wall of the Chapter House, a crucifixion, so tender yet so true, transforms the place into a Holy of Holies, and in the brother's cells—generally with characteristic humility in some obscure dark corner,—he has painted various scenes from the life of our Lord, or other Scripture subjects which change the cold, bare, narrow cells into lovely shrines.

A great many of those celebrated pictures which are now in the European picture galleries, were originally painted for altar pieces, or for special decoration panels in the churches and other buildings but have been transferred sometimes on the destruction of the church or on the dissolution of the monastery or convent, or oftentimes appropriated from existing churches by conquerors and others, and therefore are not seen by us at a disadvantage.

#### ENGINEERING.

DEFECTIVE CASTINGS.—It is stated in the English papers that an examination of the broken girders of the fallen railway bridge at Denmark Hill showed that one of them was "honey-combed with air bubbles;" and it is assumed that, as this girder gave way, the extra weight thus thrown upon the others caused the accident. It is almost unnecessary to say, according to a correspondent in *Iron* that the so-called "air bubbles" are really hydrogen cells, and that the only explanation that has been (and probably ever will be) afforded of the source of this hydrogen is that, if not exclusively, it is mainly derived from the moisture of the atmospheric blast, which becomes decomposed on coming in contact with molten iron or steel, its hydrogen being thereupon absorbed by the metal. This occurs not only in the steel converter, but also in the blast furnace and in the remelting cupola. As a consequence, both steel and iron castings are unreliable, and a constant source of danger wherever their soundness is essential to safety; and they are accordingly unfitted for a number of important purposes for which forged metal, at a far higher cost, is considered necessary. I do not propose, adds Mr. Fryer, to refer to any of the various methods and expedients which have been devised, and which are sometimes employed to cure the evil. It will, however, seem remarkable that no attempt has yet been made to get rid of the defect itself by eliminating the moisture from the blast, and thus removing the cause. One practical trial in that direction would go further to solve the whole question than all the theories that have been advanced, and all the laboratory experiments that have been tried since Dr. Muller's famous discovery of the real nature of the so-called "air bubbles" or "blow-holes."