rolled from three kinds of metal—ordinary open-hearth structural steel, ordinary Bessemer low carbon steel, and pure ingot iron. In this way was secured data relating to the resistance to corrosion of certain metals when tested out simultaneously with others. The steel plates were painted in two ways, part of them being scratch-brushed in the ordinary way before painting, thus following out the usual mode of painting structural steel, and part of the plates being pickled in sulphuric acid, in order to completely remove the scale, and the plates were subsequently washed with lime so that all traces of the acid were neutralized.

The test was conducted in a thoroughly systematic and practical manner, following out the methods employed during the tests already made at Atlantic City and Pittsburg. The Master Painters' Association co-operated in the work and gave us the benefit of their practical experience in this line. Inspectors and painters, representing the committees and sections, were upon the ground throughout the period during which these tests were made.

It has been proven that corrosion generally takes place under normal conditions in an uneven manner, and pitting is evident at certain weak spots on nearly every grade of steel or iron, in a lesser or greater degree. From these spots the corrosion proceeds and develops upon the surrounding area. The corrosion at the start, where the pitting begins, is so extreme in some cases that holes are formed, of considerable depth, before the surrounding surface is attacked to any marked extent. The causes of this pitting have been fully explained by the electrolytic theory. This theory overthrows the former theories which were held, regarding corrosion. The carbonic acid theory, for instance, held by Calvert, supposed that carbonic acid attacked the iron, converting it into carbonate, and the carbonate being oxydized to hydrate or ordinary rust by the oxygen of the air, the carbonic acid regenerated and acting again on an unattacked part of the metal. According to the peroxide theory, the iron, oxygen and water were supposed to react to form ferric oxide, and to regenerate hydrogen peroxide which would attack a new quantity of iron. That the electrolytic theory is the most tenable has been demonstrated in many ways, but one of the most beautiful demonstrations may be carried out in a very simple manner.

A five per cent. solution of gelatine in hot water is made, and after careful neutralization, a few drops of phenolphthalein and ferrocyanide of potassium are added. A thin layer of this solution is poured upon the bottom of a glass dish, and when stiffened up by cooling, a clean strip of metal is placed thereon. A further quantity of the gelatine solution is poured upon the metal and allowed to solidify. The gelatine in this case is used to retard diffusion of the colorations which form. As stated before, when a strip of steel is placed in water, there are developed hydroxyl (OH) ions at the negative pole, and these are shown by a pink coloration formed with the phenolphthalein, whereas at the positive pole of the iron plate the development of hydrogen ions takes place, and solution of the iron proceeds. This solution forms, with potassium ferrocyanide, a blue coloration which to the paint chemist is known as Prussian blue.

It is a well known fact that zinc protects the iron from corrosion when in contact, the zinc going into solution, being electro-negative to iron, thus protecting the iron from being acted upon. It has been found that the zinc will protect the iron only to a certain extent, unless an electrolyte is contained within the water, this being due to the fact that pure water offers too great a resistance for the current to flow.

It has been shown by our investigations that certain pigments have the property of preventing galvanic action, and their use is highly desirable in a paint coating. Other pigments have been found to exhibit a strong tendency to excite galvanic action because they possess the property of being good conductors of electricity. Such pigments should never be used next to steel.

The Scientific Section of the Paint Manufacturers' Association have made a very careful and systematic study of this vital question, and are at present pursuing the work started, making tests of extreme value and recording their observations for future generalization. Such work can only be productive of the most valuable results and will ultimately result in the restriction to certain materials for use in painting iron and steel and the adoption of these materials in specifications for such work. The qualification of each and every raw product will be determined, and its legitimacy for existence in a paint will be closely questioned before giving it final approval.

It is not the intention to make any derogatory reference to certain products which are under suspicion or to attempt to tear down the business that has been built upon these products, but before we can give our candid endorsement to any raw product for use in a paint to be applied direct to iron or steel, that product must possess certain fundamental requisites which we have already outlined. The distinction between an inhibitive and a stimulative pigment may be easily determined, and it is essential to the preservation of the steel upon which such pigments are to be used, that the inhibitive principles should predominate.

That there is a marked difference in paints as well as as in steel has been proven beyond the shadow of a doubt, and evidence is collected every day confirmatory to this statement. One of our foremost metallurgists recently returned from a visit to the Isthmus of Panama, and, while there, he inspected some of the old steam engines used by the French Government, in their futile attempt to join the Atlantic and the Pacific. These engines had lain in the morass and jungle for many years, subjected alternately to the torrid heat of day and the excessive humidity of night; rare conditions for active corrosion being always present. Some of the engines were nothing more or less than a flimsy network of holes, and the material had completely gone to waste (of the open-work variety), resembling the latest thing in summer hosiery. Other of the engines had been protected with certain paint coatings that had preserved the steel intact, and the American engineers were able to pull these engines out of the morass and by substituting a few accessories, to use them again. The nature of these coatings which have withstood the test of years are at present being investigated by the Scientific Section to determine the pigments used therein.

Another engineer recently returned from Colon reports that the iron posts surrounding the consul's home and from which were suspended a line of linked chain, showed active corrosion on the south-east side in every case, while the back of the posts were slightly, if at all, affected. These posts back of the consulate were unaffected in any place because of the protection from the southeast winds afforded by the house. The winds blowing in, laden with salty humidity, had naturally exerted their corrosive effect on the surface not thus protected.

A recent examination of the steel test fences erected by the Scientific Section, at Atlantic City, was confirmatory of the above. The inspection was made early one morning, after a rainy night. The weather had cleared up and the brisk wind which had continued throughout the storm was blowing from the same direction and rapidly drying the moisture on the steel plates. The object of the inspection was primarily to determine the moisture penetration and water shedding properties of each pigment and paint. A better day or time for such a test could not have been chosen.

As has been described before, the fences are three in number, made of three classes of steel and each presenting toward the sea a series of 100 plates with as many upon the reverse side. It was apparent at once that the rain had impacted only against the steel plates facing the ocean or