system, it will be fair on our part to let the gentleman have the first say, and I, therefore, propose to read you some excerpts from a paper read by him before the American Association of Iron Founders at Philadelphia, and following with some observations from my own experience. He said in part:

Much has been said and written the past year or two about science in the foundry. Some writers claiming one theory and some another, as to the actions and reactions taking place in an ordinary foundry cupola while melting is in progress. Chemical action, unlike many other actions, cannot be described as it is only known by its effects, and the nearest approach that man can come to a description of chemical action is by regarding it as a molecular attraction or motion of the masses in action. The Dalton law of fixed and definite proportions which so beautifully serves to relate chemistry to Voltaic electricity, though adopted in its entirety by a large number of chemists, presents great difficulties when applied to all chemical combinations, and among the number, iron. Twenty-seven grains of iron will combine with eight grains of oxygen or with twenty-four, or with three proportionals of oxygen, yet no compound is known which twenty-seven grains of iron will combine with two proportionals or sixteen grains of oxygen; although such a compound may yet be discovered, and therefore, we should not on this account condemn the atomic theory. But now comes the difficulty, twenty-seven parts by weight of iron will combine with twelve of oxygen, and twenty-seven parts of iron will also combine with ten and two-thirds of oxygen, or if we retain the unit of oxygen we must subdivide the unit of iron, or we must subdivide both by a different divisor—this being so, what becomes of the notion of an atom or molecule physically indivisible. It is true that in the case of solution different proportions can be united up to the point of saturation without any difference in the character of the compound. For example, one class of pig iron may contain a certain amount of silicon, carbon, phosphorus, manganese and sulphur; and another class contain exactly the same proportions of these substances, yet the two irons will not give the same resultant casting, although melted in the same cupola and under the same conditions. Then we must arrive at the conclusion that there must be a variation in the metallic iron, and in this respect to the chemist, metallic iron is metallic iron, and in our present state of knowledge and education chemistry cannot give the character of it, and the consequence is that we are never sure of the same results, even on the same analysis and there may be a variation of ten per cent. in strength in the castings made from the two irons. Then the question arises,