

glass; mixed however, with a certain proportion of copper, an alloy is produced which possesses the properties of a valuable metal, capable of applications not only very important in themselves but for which it seems difficult to find any other metal or metallic alloy equally suitable. This mixture of aluminium and copper is the alloy called aluminum bronze. The alloy seems to have been first made a few years ago by Dr. Percy. Many of our readers will remember the specimens which were placed in the International Exhibition by Messrs. Bell, of Newcastle; and a later exhibition of articles manufactured from this substance by Messrs. Mappin, of Regent Street, must have familiarised most persons with its fine general appearance. Beauty of external appearance, however, is but one quality of a metal, and although an all-important one, in certain respects, it is one without which, as in the instance of iron, the metal may possess the most valuable and interesting properties. Without beauty of surface, it is true that its applications must be limited to the useful; but in England, where the employment of metallic substances is so varied and so extensive mere beauty is a secondary consideration. In the case of aluminum bronze however, beauty of exterior and more sterling qualities are united. In colour, this alloy resembles gold so closely, that it would be difficult by mere inspection to distinguish one from the other; but its mechanical quantities excel those of gold. It is composed of copper and about 10 per cent. of aluminium melted together, and remelted once or twice. It is stated that the most essential condition to success in producing the alloy is purity in the copper employed; the best copper for the purpose, although its price prevents it from being much used, being that deposited by galvanic action; the next best is from Lake Superior, which is very pure, and yields with aluminium, a very good alloy. The re-melting of the alloy is a matter of great importance. The first melting appears to produce intimate mechanical mixture, rather than chemical combination of the metals; as in the proportion of 10 of aluminium and 90 of copper, an alloy of a very brittle character is produced by the first melting; but renewed opportunity of uniting into a definite chemical compound being afforded by repeated melting a more uniform combination seems to take place, and a metal is produced free from brittleness, and having about the same degree of hardness as iron. The alloy containing rather less than 10 per cent. of aluminium, is said to possess the most uniform composition and the best degree of hardness; but it is not always an easy thing to produce this desirable uniformity of texture; as patches of extreme hardness sometimes occur, which resist the tools and are altogether unamenable to the action of the rollers. The alloy produced by this combination of copper and aluminium is very tenacious, malleable, rigid, light in weight, and possesses a fine golden colour. Its qualities being so various, we have to view it in two different characters, viz., as suitable to the manufacture of ornamental articles, to which it is adapted from the closeness of its resemblance to gold; and as capable of being applied, on account of its valuable mechanical properties, to useful purposes, to many of which it seems to be better fitted than any other metal or alloy.

With regard to the first, but what is really after all, the least important of its characters—that is, its adaptability to ornamental uses—the points to be considered are: colour, condition of surface, capability of receiving impressions from dies, or being worked and chased, and, lastly, insusceptibility to the action of oxygen and sulphur. What is the situation of aluminum bronze with reference to these questions? In its application to ornamental purposes this alloy is, undoubtedly, a valuable addition to the resources of the artist, inasmuch as it affords him the means of imitating almost exactly the effect of gold, in a material very superior to the ordinary gold substitutes, homogeneous in texture and colour, and comporting itself with respect to external influences, more like silver than a cheap alloy. In sculptured and chased work, it presents a similar depth and richness of effect with gold, and in polished surfaces it is almost equally brilliant; while in cases where it was thought that the colour of the alloy does not afford a sufficiently close approach to the tint of pure yellow gold, it will probably, as a gilding metal, present the best possible foundation for a coating of fine gold.

In many respects therefore, the new alloy may be reasonably expected to play an important part in relation to ornamental work. It remains to examine its qualities with regard to important mechanical applications, and it is here that the valuable qualities of the alloy come out in the strongest manner. In respect to this part of the subject, the properties of the metal to be considered are its tenacity, malleability, power of resisting compression, rigidity, founding qualities, behaviour under the action of tools, and specific weight. With regard to most of these points, the aluminum alloy compares with great advantage with all other metals and alloys. In experiments made in the Royal Gun Factory at Woolwich, by Mr. Anderson upon the tensile strength of this metal, he found it to exceed that of the best gun metal in the ratio of 2 to 1; the aluminum bronze sustaining a strain of 73,185 lbs. to the square inch, the gun metal not more than 35,040 lbs.; whilst the tensile strength of the best cast steel is about 72,000 lbs. So with regard to the power of resisting compression it was found that a specimen of the alloy bore a crushing force of 132,000 lbs. per square inch, whilst there were no indications of compression until 20,384 lbs. per inch had been applied; the strength of the alloy under compression exceeding that of the best cast iron, which, may be taken at less than 120,000 lbs. The superiority of the metal extends likewise to the question of transverse strength or rigidity, wherein it surpasses gun metal in the ratio of 3 to 1, and brass in the ratio of 44 to 1. As a founding metal, it can be employed without difficulty, and it produces castings of any size, of the best character; whilst under the file, and in the lathe, it can be worked almost as easy and freely as gun metal. Although it can be rolled into sheets, it is said that it does not solder very readily nor strongly, and this might perhaps prove some impediment to its use in producing certain forms of work. But in every other respect, ordinary mechanical manipulation can be applied with the greatest success.

There is an important quality of the alloy not yet mentioned, that is its low specific gravity. The