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BRITISH MANUFACTURING INDUSTRIES: POTTERY, GLASS AND SILICATES, FURNITURE AND WOODWORK.

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Содержание

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PREFACE

The object of this series is to bring into one focus the leading features and present position of the most important industries of the kingdom, so as to enable the general reader to comprehend the enormous development that has taken place within the last twenty or thirty years. It is evident that the great increase in education throughout the country has tended largely to foster a simultaneous interest in technical knowledge, as evinced by the spread of Art and Science Schools, Trade Museums, International Exhibitions, &c.; and this fact is borne out by a perusal of the daily papers, in which the prominence given to every improvement in trade or machinery attests the desire of the reading public to know more about these matters. Here, however, the difficulty commences, for the only means of acquiring this information are from handbooks to the various manufactures (which are usually too minute in detail for general instruction), from trade journals and the reports of scientific societies; and to obtain and systematize these scattered details is a labour and a tax upon time and patience which comparatively few persons care to surmount. In these volumes all these facts are gathered together and presented in as readable a form as is compatible with accuracy and a freedom from superficiality; and though they do not lay claim to being a technical guide to each industry, the names of the contributors are a sufficient guarantee that they are a reliable and standard work of reference. Great stress is laid on the progressive developments of the manufactures, and the various applications to them of the collateral arts and sciences; the history of each is truly given, while present processes and recent inventions are succinctly described.

BRITISH MANUFACTURING INDUSTRIES

POTTERY

By L. Arnoux, Art Director and Superintendent of Minton's Factory

Without entering into an elaborate dissertation on the antiquity of the Art of Pottery, which would be out of place in so short an article as this, I will briefly state that the practice of making vessels from plastic clays, for holding liquids and provisions, first resulted from the exertions made by man to emerge from his primary condition. It is a well known fact that vessels of clay, only partially baked, have been found, together with stone implements belonging to prehistoric times, and that those vessels, unfinished as they were, had peculiar characteristics. But supposing that this was not so, it must strike everybody that, after providing himself with those rude instruments wherewith to obtain his food and protect his life, man must have taken advantage of his power of observation to notice the property of plastic clay to retain water, and to find out to what useful purpose it might be brought for making vessels better suited to his wants, than the skins of animals or pieces of wood roughly hollowed out. If not probable, it is however not impossible, that the first man, taking in his hand a lump of soft clay, should have tried to give it a defined shape, in which case the art of pottery would be as ancient as the human race. It may have been anterior to the use of fire, for a sound and useful pottery may be made with clay hardened in the sun, as still practised in Egypt and India. At all events, it existed previous to the working of the first metal, as one can hardly understand how bronze could have been melted, without the assistance of vessels made of fired clay carefully selected. Consequently it is admitted by everybody, that this is one of the earliest of human inventions, and that the material has proved most durable. This durability, secured by the application of heat, is a very remarkable phenomenon; for while many other materials, apparently very hard, have been found unable to stand the atmospheric changes or the continuous contact with a damp soil, it was sufficient to submit this one to a very moderate heat, to be enabled to resist these various agencies for several thousands of years. This is particularly noticeable in the black Greek pottery, which, while possessing all its former appearance, can, however, be scratched by the nail or broken by a gentle pressure between the fingers. It is thus that we are indebted to the art of pottery for innumerable works of art, many of which have proved most useful in elucidating historical facts, and making us acquainted with the habits, dresses, and ceremonies of ancient peoples.

One can understand how difficult it is to decide who were the earliest potters. It is a question that archæologists have often tried to answer, but which is not likely to be ever solved. Pottery was created to meet a special want of the human race, and we find early pottery existing in almost every part of the world, in unknown America, as well as in Europe or Asia. It is, however, easier to decide which people first excelled in it, and in this respect we must give equal credit to the Egyptians and the Chinese. It is mentioned in sacred history that more than 2000 years B.C. the Egyptian potters were celebrated for their skill, and if we can believe Chinese tradition, the manufacturers in China were at this same time under the control of a superintendent appointed by the government. Unfortunately, we have very little information respecting the history of the art in China, previous to the sixteenth century; and although we have a notion of what they did and how they did it, it is wiser, with our imperfect knowledge, to abstain from speculating as to when the different sorts of Chinese ware were produced. But as regards the Egyptians, there is no uncertainty; some of their ceramic relics bear their own inscriptions, and others have been found associated with objects or monuments whose

dates have been carefully ascertained. We may well believe in their skill, when we know that they were acquainted with the most difficult processes for making the bodies and glazes, and that they used the same metallic oxides for colouring their ornaments that we are now using, though often, let us acknowledge, with less success. During a period of at least eleven hundred years, from the eighteenth to the twenty-fourth dynasty, they displayed considerable ingenuity in the production of small figures, jewellery ornaments, and hieroglyphic tablets, in which several sorts of pottery mixtures and differently coloured glazes were most cleverly associated. It is from Egypt that sound principles of pottery making seem to have spread to the different nations; first to the Phœnicians, who in their turn became famous for their knowledge in the art of vitrifying mineral substances; and then to the Assyrians, who seem to have applied pottery more specially to the ornamentation of their buildings.

Greece, who shortly after received her first notions of art from the two former nations, did not devote her energies so much to improvement of material and richness of colour, as to the refined beauty of the shape and the excellence of the painting.

In pottery, the material is of little value, and it is only by the art displayed in shaping and decorating it, that its price can be increased. In this respect the Greeks proved to what enormous value it could be raised, by making it the groundwork of their art, since sums equivalent to several thousand pounds of our money were readily paid by Roman patricians for a single Corinthian vase. In this, as in the other branches of art, the recognized taste of the Greeks will never be surpassed; and if at the present time little attention is paid by collectors to their ceramic productions, it is probably owing as much to the versatility of our tastes and fancies, as to our inability of showing the articles to their advantage.

The Greeks seem to have monopolized the ceramic production of these fine works for seven or eight centuries at the least; for although vessels of the same description were largely produced in Italy, it was invariably by the Greeks, following closely the traditions and mode of decorations of their own country. It was only about a century B.C. that the Romans began to create a pottery on which they impressed their stamp, a pottery really their own; I mean that which is so improperly called Samian, and so easily known by its reddish colour and the embossed ornaments by which it is profusely covered. It is, however, genuine and characteristic, neatly executed, and possessing some standing qualities which did not belong to the Greek. On the other hand, the refinement is deficient; the forms are derived from the circle instead of the ellipse; the plain surfaces are replaced by embossments, and the painting is absent. For four centuries, the Romans seem to have made this class of pottery in several of their European settlements, chiefly in Italy and in the provinces adjoining the Rhine. In the operation they seem to have required some special material, which imparted to its bright red surface a semi-shining lustre or glaze, and which has proved remarkably durable. After this, the art of pottery experienced a time of darkness, when all the refined processes seem to have been neglected, and primitive vessels, like those produced by the Saxons, Gauls, and Celts, ranked amongst the best examples. The decorations, if any, are rudimentary; not only is the painting reduced in a few instances to some lines or spots made of a different clay, but even the embossed ornaments are replaced by lumps of clay or impressed lines in a kind of geometrical disposition. Art was not quite dead, but it scarcely breathed. However, these specimens are not altogether uninteresting, for they were the first efforts of our forefathers, and there is always a certain pleasure in witnessing the feeblest attempts made in the research of art.

But the time came when pottery was to accomplish another revolution, no less remarkable than the first. Strangely enough, it was again from the East, in nearly the same province in which it originally took its rise, that it was revived, and it is not unlikely that some faint tradition of the old processes was the source whence sprung the new ceramic era, which was to extend to our own time.

The precise date of this revival is not positively ascertained; but it was probably contemporary with the establishment of Islamism amongst the Arabs. The energy displayed by this people in improving and adapting the different fabrics to the requirements of their new religion, was no doubt

beneficial to the art of pottery, and with their fanaticism and spirit of proselytism, they carried their new ideas to every country which they conquered. Syria became a great industrial centre, and some of its towns, such as Damascus, were soon famous for the perfection of their wares. To reach Europe, however, this new movement did not take its course through Greece and Italy, as in the first instance; it was through Egypt and the North of Africa that, at the beginning of the eighth century, it made its way to Spain, where it became firmly established. As regards pottery, nowhere were better specimens produced than in the towns of Malaga, Grenada, Cordova, and others, going northwards as far as Valencia and Toledo. The newest feature of the Arabian or Saracenic pottery (called Hispano-Moresco ware, when made in Spain) was the introduction of the oxide of tin in the glaze, to render it opaque. Previous to this innovation, when white was required for a design executed on a clay which did not take that colour in firing, these parts had to be covered with a silicious mixture, and subsequently coated over with a transparent glaze. This was the Assyrian and Persian process. To find a white opaque enamel, which could be applied direct on a coloured clay and adhere firmly to it, was a great discovery.

Everyone now knows how successfully these people used pottery for the ornamentation of their buildings, and how ingeniously they mixed transparent and opaque enamels to obtain an unprecedented harmony of effect. Not only did they use this tin enamel in parts, but also all over the ware, making it more or less opaque as they wished; and this was the origin of the pottery called *majolica*, which, according to tradition, was imported from Majorca to Italy, at the beginning of the fifteenth century, and for the introduction of which credit is given to Lucca Della Robia. *Terra invitriata* was the first name given by this sculptor to his works, when they were coated with this opaque mixture. There was at that time such an earnest desire to find suitable materials for art decorations, that the new enamels soon ceased to be exclusively applied to architectural purposes. Under the beneficial influence of the revival of taste for ancient art, and the encouragements with which it met from the princes at that time ruling the Italian Republics, majolica attained its beauty, though its external appearance reminded us but little of its Spanish or Oriental origin. During the course of the fifteenth and sixteenth centuries, the most famous in the history of modern art, the influence of the great painters of that period was soon felt by those whom we may call the artists of pottery, for the name of potters could hardly do them justice; and several of them applied their talents to the reproduction, on that ware, of their most celebrated paintings. It was reported that Perugino, Michael Angelo, Raphael, and many others painted majolica ware, probably on account of their cartoons being often reproduced; and it is sufficient to say that such talented men as Francisco Xanto da Rovigo, Orazia Fontana, and Georgio Andreoli, devoted their energies to the improvement of this branch of art. Most of the Italian towns had their manufactory, each of them possessing a style of its own. Beginning at Caffagiolo and Deruta, they extended rapidly to Gubbio, Ferrara, and Ravenna, to be continued to Casteldurante, Rimini, Urbino, Florence, Venice, and many other places.

After the sixteenth century, majolica soon degenerated in appearance and quality, the producers being more anxious to supply the market, than to devote to their ware the care and attention bestowed on it by their predecessors. In increasing the quantity of tin in their enamel, to make it look more like porcelain, they impoverished their colours, and this alteration, however prejudicial to majolica, assisted greatly in the new transformation which it was subsequently to undergo. It was under the name of faïence that it continued to be known, and France and Holland became the principal centres of its manufacture. At Nevers, it still resembled slightly the Italian ware, though at Delft, in Holland, it was principally made to imitate the blue and white ware of the Chinese, in which attempt the makers were often remarkably successful. At Rouen, the blue ornamentation was relieved with touches of red, green, and yellow; at Moustiers, the monochrome designs were light and uncommonly elegant; at Paris, Marseilles, and many other places, the flower decoration of the old Sèvres and Dresden ware was imitated with a freedom of touch and a freshness of colour which is really charming. This pottery, which was a great favourite in the seventeenth and eighteenth centuries, declined rapidly soon after

our present earthenware made its appearance; the chief inducement for the change, on the part of the manufacturers, being the excessive price of tin, which is the principal ingredient of enamel.

Except in the provinces contiguous to France, Germany was never a producer of majolica. It created, however, a pottery entirely of its own, full of originality in its general appearance, and which, by the peculiarity of the process, was really a very distinct type. I am alluding to the Flemish and German stoneware. There is a tradition, that the first pieces were made in Holland at the very beginning of the fifteenth century. The principal centre of its production was, however, in Germany, at Nuremberg, Ratisbon, Bayreuth, Mansfeld, and other places; but the best were made in the neighbourhood of the Lower Rhine, where the clays most fitted for that class of pottery were easily to be found. Here we find, for the first time in Europe, the body of the ware partly vitrified by the high temperature to which it was submitted, and also the remarkable peculiarity, that it was glazed by the volatilization of common salt, thrown into the oven when the temperature had reached its climax. The combination of these two processes had never been effected before, and it would be difficult on that account to find any connection between stoneware and some of the Egyptian potteries. This stoneware varied in colour: some were almost white, some brown, others of a light grey, the last being the most valuable when the effect was increased by blue or purple grounds, harmonizing admirably with the foundation colour of the ware. The shapes are generally elaborate, with a great many mouldings, enriched with embossed ornaments in good taste, some of which were designed by no less an artist than T. Hopfer. The decline of this stoneware began with the seventeenth century, and from that time to the present, this material was only used for wares of the commonest kind. It is only very lately, that it was revived successfully by Messrs. Doulton and Co., of Lambeth.

France, which had not as yet any ideas about the process for imitating the Italian majolica, created towards the same time two new sorts of pottery, one of which is the Palissy ware, the other the faïence d'Oiron. Palissy, a very inquisitive and intelligent man, is said to have been possessed by a strong desire to reproduce some Italian ware, which he had the opportunity of seeing; whether it was a piece of majolica or of graffito, is not known. Left to his own resources – for there was nobody to instruct him – he succeeded by perseverance and industry in finding out the process for making the different coloured glazes that the Moors had used long before him. There was no discovery in this, but the talent which he displayed in the mixing and blending of these vitreous colours, combined with the incontestable originality of his compositions, have made this ware very difficult to imitate.

The time of its production was limited to the life of Palissy, for there is not really a single good piece which can be traced to his successors. In the faïence d'Oiron, incorrectly called Henri Deux ware, we find a real cream-coloured earthenware taking precedence of two hundred years over our own. It was made between the years 1524 and 1567, and we have now every proof that three persons co-operated in this invention: Heléne de Hangest, who had been formerly entrusted by François I. with the education of his son, afterwards Henry II.; her potter at Oiron, named François Charpentier; and her secretary Jehan Bernart. The charming pieces resulting from the combination of these three intellects were few, and only intended to be offered as presents to the friends of the noble lady at court. This sufficiently explains the monograms and devices, which are found associated with the elaborate ornaments profusely spread over their surface. No ware was ever made before or after this, which required more care and delicate manipulation, and this explains why the highest prices paid in our generation for an article of pottery have been freely given for several of these curiosities. Their principal feature consists in inlaying differently coloured clays one into the other, a process not quite new, as it had been extensively used in mediæval times for making encaustic tiles for the flooring of our churches, but they were so minutely and neatly executed, and the designs so well distributed, that they are justly considered as marvels of workmanship. In speaking of these faïences d'Oiron, we can hardly admire sufficiently the variety in the productions of this period of the Renaissance; and if we select four of these specimens, such as a piece of Faenza ware, one of stoneware, one of Palissy, and another of Oiron, they may fairly stand as good illustrations of the ingenuity of man.

The progress realized in these times seems to have undergone a sort of lull, and if we accept the French and Delft faïences, which were a transformation of majolica, we find that the greatest portion of the seventeenth century was not marked by any new discovery or decided improvement. Towards its close, however, we begin to notice in Germany and the western countries of Europe several attempts at making a ware, possessing the three standard qualities of whiteness, hardness, and transparency of the Chinese, and these were the precursors of the great movement which occupied the whole of the eighteenth century. As might be expected, inquiries made in different countries by persons unacquainted with each other, brought different results; and if they failed in so much, that a porcelain identical to the Oriental was not reproduced, all of them succeeded in making a white ware of their own, adapted to the materials which they had at their disposal. And thus arose in each country the source of a prosperous trade.

It is only at that period, that England began to take her position amongst the producers of pottery, at least in a manner deserving of that name. Up to that time, if we were to judge by the quality of her work, she did not seem fitted for it, no more than for any sort of manufacture which required taste or a certain knowledge of the arts of design. In fact, it is easy to notice in looking at our collections of art manufactures, that the English samples are deficient in many respects; they may be gaudy without harmony of colour, or elaborate without refinement, exhibiting a certain amount of roughness in execution, when placed side by side with Italian, French, or German specimens of the same class. It is likely, with certain exceptions, that the Anglo-Saxon race did not feel much the want of all those niceties, and did not make great exertion to excel in the practice of those arts, for the appreciation of which its mind was not yet sufficiently cultivated. It has been remarked, that as the progress of art was constantly from East to West, the geographical position of England might account in some respects for her backwardness. However, like children of slow growth whose understanding does not seem quick or acute, but who afterwards derive the benefit of their reserved strength, England, coming almost the last in the production of pottery, seems as though she did so for maturing her capabilities. In this, as in the practice of other arts, she is slow, and her first steps are clumsy. Experimenting for some time, with mixed or indifferent success, she seems to hesitate, till she begins to feel that she holds the thing in her grasp, and then the day soon comes when she teaches the world what she can make of it. We can scarcely give her credit in the preceding review for some Staffordshire pottery made with the yellow or red marl, thickly glazed with the galena extracted from the Derbyshire mines, the decoration of these pieces being effected by pouring the light clay on the dark one in a symmetrical manner. This pottery was in use from the time of Queen Elizabeth down to the year 1775, the date of the latest specimen that I have seen. Some pieces preserved in the British Museum, in the Museum of Geology, and in M. Solon's collection, are to be noticed for their quaintness.

Up to the eighteenth century, no other clays than those extracted from the coal measures seem to have been used in Staffordshire; and the advantages derived from an abundant supply of both clay and fuel must have powerfully contributed to the settlement of this industry in that county. In Shaw's 'History of the Staffordshire Potteries,' which with Plot's 'History of Staffordshire,' are the only books to afford information on the then state of this trade, and whose most interesting extracts have been given by Sir Henry de la Beche in his excellent catalogue of the pottery exhibited in the Museum of Practical Geology, we gather this fact, that so far back as 1661, an Act of Parliament regulated the dimensions and quality of earthen vessels manufactured at Burslem, for holding the butter brought to the markets.

Towards 1680, a radical change seems to have taken place in the way of making the ware, by substituting common salt for the galena in the glazing process. This new production was called *crouch ware*, and there is every probability that the substitution was first made by a person acquainted with the manufacture of the German and Flemish stoneware, which at a former period had been tried in England. At that time Burslem possessed twenty-two ovens, and Shaw says, that when these were at work, the vapours emanating from the salt were such as to produce a dense fog in the town. These

assertions leave no doubt as to the date of the commencement of this manufacture in Staffordshire, and that Burslem was its first seat.

Two German brothers, of the name of Elers, who settled near this town in 1688, seem to have been the first to try to produce pottery of a better class than the crouch ware. Their first attempt resulted in the production of a well finished red stoneware, which probably resembled the red ware made in Saxony by Bottger at the same time. Those who have left any written information about it, say that for general appearance and careful execution, it was quite equal to any similar article made by the Chinese; but I must confess, that the specimens that I had the opportunity of seeing are rather porous and far from being highly baked. These foreigners paid also great attention to the improvement of the white ware, and they were the first to employ the plastic clay from Dorsetshire for the purpose of whitening the cane marl of the locality. Their ware was generally light and well-shaped, and though the plaster moulds were wholly unknown at the time, and were only introduced fifty years later, the impressions taken from metal moulds are neat, and show the ornaments standing sharply out from the surface. This, combined with the peculiar appearance given to the surface by the sublimation of the salt, and its light colour, are the principal feature of the Burslem ware, which continued in existence till 1780, although before that date more perfected articles had found their way to the market. The brothers Elers used to make a great secret of their mixtures, and left the district as soon as the other manufacturers became acquainted with them. Astbury, who had been instrumental in robbing them of their processes, was one of the most intelligent amongst these potters, and it was he who, in 1720, introduced the flint, calcined and ground, for whitening the body of the ware, one of the greatest improvements in the making of earthenware. He seems to have been a thoughtful and persevering man, and it is said that the idea of this new material was suggested to him, by seeing a shoeing smith calcining a flint, for the purpose of blowing the dust into the eyes of his horse, suddenly afflicted with a kind of blindness. This is probably only a fiction, as the idea must have originated from witnessing the change undergone by flint when brought to a red heat.

As the pottery trade was taking root in the district, it is no wonder that we find many intelligent manufacturers doing their best to improve it and make it profitable. Eminent amongst them was Josiah Wedgwood, whose name as a potter is never likely to perish. For particulars concerning his private life, trade, and manufacture, there are two excellent books, by Miss Meteyard and Mr. Llewellyn Jewitt, in which every matter of interest about him has been carefully entered. Born at Burslem, in 1730, of a family of potters, he began by serving his apprenticeship as a thrower under his brother, and must have settled in business very early, as he had had already two partners when he set up on his own account, in 1759, being then only twenty-nine years of age. His first attempts seem to have been directed to making a green ware, that is, a white ware covered with a glaze of that colour, which he succeeded in getting particularly bright; and also to the tortoiseshell, which had its surface mottled with glazes differently stained, and which, by their blending when they are fused in the oven, present some analogy with the works of Palissy.

One of Wedgwood's decided successes was, perfecting the white cream-colour ware, which was so superior to anything done before, that it commanded at once a great sale at home and abroad. Queen Charlotte admired it much, and, in consequence of her patronage, it took the name of Queen's ware, under which it was known for a long time. It is light, of a pleasing colour, elegantly shaped, and in the hands of artists has proved an admirable material to paint upon.

It would take too long to enumerate all the improvements which Wedgwood effected in his trade in the second half of the last century, but I must mention as prominent amongst his works, the black Egyptian and jasper wares, in making which he had no assistance whatever, and which constitute two new and perfect types in pottery. From Wedgwood's origin and early labours, it is easy to guess that his instruction must have been limited; but he was a clear-minded and inquiring man, possessing that sort of intuition by which he could easily understand things, which in other people would have required preliminary studies; besides, he had a natural taste for art and a systematic way

of going through his experiments, which were sure to bring them to a successful issue. It was his good fortune to be assisted by two men of superior intelligence, viz. Flaxman, the sculptor, who designed many of his shapes, and modelled for him an almost innumerable number of subjects for slabs and cameos; and Thomas Bentley, a distinguished scholar, with whom he was commercially connected, and whose knowledge of art he found of great utility.

When Wedgwood died, in 1795, the ceramic manufacture had extensively developed, and had extended from Burslem to the small towns in the neighbourhood. From all this it must appear that, although Wedgwood was the most brilliant type amongst the English potters of that period, the trade was already well established when he entered the business, and there was every probability, that it would become one of the staple industries of this country. To give all the credit to him would be an injustice to several men, who, like the two Josiah Spodes, effected great improvements, or brought into play new and useful materials.

When I speak of the china manufacture, it will be seen that, besides the Staffordshire potters, several very clever men at Bow, Chelsea, Plymouth, Worcester, Derby, and other places, were at work to establish the manufacture of the soft and hard porcelain, proving beyond a doubt, that most energetic efforts were being made to raise the pottery trade of England to the same level as that of France or Germany. If we did not then succeed in making soft china like that of Sèvres, or hard porcelain as good as the Dresden, we soon became the masters of the market as regards earthenware – a position that we are not likely to lose for many years to come. Amongst the circumstances which combine to make our position particularly strong, it is enough to mention our independence as regards the supply of the raw materials, and the abundance of our clays and fuel, of a better quality than those at the disposal of our competitors. Besides, the localization of this manufacture in Staffordshire has caused the concentration in this spot of an intelligent population, acquainted with the traditions, from which the different branches of the trade can be easily fed.

The soil of Staffordshire produces a variety of clays which are used for common ware; but the most important is the one called *marl*, which is fire-clay from the beds of the coal measures, used for making the "saggers," or clay boxes, in which the ware is placed before it is sent to the ovens. The quantity required for this purpose is very large, and it was of the utmost importance that such material should be good, cheap, and easily procured.

At present, however, the clays necessary to make china or earthenware are not found in Staffordshire, but are sent from the counties of Dorset, Devon, and the Duchy of Cornwall, where they constitute an important branch of commerce. It is a common occurrence to hear people, visiting Staffordshire for the first time, wonder at the apparently abnormal fact of an industry settling in a district where none of the requisite materials are to be found. I have mentioned in the preceding pages how it happened that the trade first settled in Burslem; and a short explanation will show that, although more perfect clays from distant counties had to be used, there was no need to change.

For baking pottery, the quantity of fuel required is comparatively large. When, independently of the ovens and kilns, we take into account what is absorbed by the steam-engines, preparation of materials, and warming of the shops, we find that for every ton of manufactured goods, at least three tons of coals are wanted, and that for decorated goods, it will take twice that quantity, and even more. As the districts from which the clays are sent have no coals, the advantage of paying the carriage on the smallest number of tons to be brought to the works becomes evident.

The potter's clay derives its origin from several felspathic rocks, which under various influences have been decomposed, and the finest portion washed away, to be collected in natural depressions of the soil, where it has formed beds of various thickness. Chemically speaking, it is a silicate of alumina in combination with water, with the addition, in small quantities, of different materials, such as potash, soda, lime, or iron, acting as fluxes on the silicate, which otherwise would give no signs of vitrification. The iron, which may exist in different states, has a colouring effect injurious to the clay, which, to be useful, must be almost free from it. When this condition occurs, the excellence of

the clay is determined by the quantity of alumina that it contains. Pure silica, in the form of quartz, flint, or sand, is a very easy material to procure when wanted, but as no geological formation yields alumina in the pure state, no other can be got, besides that which already exists in the clays. It is a common error to say, that it is the silica which renders them refractory. It is true that pure silica can stand any amount of heat without fusing, but its readiness to combine with alkaline matter, and to form vitreous compounds, renders its use objectionable when heated with metallic oxides. An excess makes the wares brittle and unable to resist sudden changes of temperature, while alumina, on the contrary, gives these qualities, and with them the plasticity required for the working of the ware. From it the clays derive the property of absorbing and retaining a large quantity of water, and such is its affinity for it, that sometimes a red heat will hardly suffice to expel it completely. Alumina is a light material – silica a heavy one; and a potter ought to know approximatively in testing the density of a sample, whether it is rich or poor in either of the two. The reason why the clay deposits are richer in alumina than the rocks from which they originated, is explained by the lightness of this element, which, being kept in suspension in water for a longer time, was consequently carried farther, leaving the silicious refuse to settle on its way.

For earthenware or china, the English potters use only two sorts of clays: the ball clay, also called blue clay, and the kaolin. For porcelain the last only is used; for earthenware, both. The ball clay, exported from Teignmouth and Poole, comes from the lower tertiary clays of Devon and Dorset, and is remarkably good and plastic, the quantity of iron being comparatively very small. The ball clay from Poole is dug in the neighbourhood of Wareham, by Mr. Pike. It is of a very superior kind, and more than 70,000 tons are sent from that harbour alone to the potteries, besides smaller quantities to the Continent. As it possesses a little more alumina than those from Teignmouth, which are dug at Teigngrace and Whiteway, near Bovey Heathfield, they ought to have a little superiority over these, although in practice the difference is not always perceptible.

Kaolin is the Chinese word given to the clay from which hard porcelain is made, though here it is generally called China or Cornish clay. This material is found in some granitic rocks in an advanced state of decomposition; the felspar, their most important element, having under external influence lost the greatest portion of its alkali, and become converted into a kind of earth. By agitation in a large quantity of water it dissolves readily; the refuse, composed of quartz, mica, schorl, and undecomposed felspar, sinks by its own weight to the bottom of the tank where the liquid mixture is to run; and the finest part, which is the kaolin, is carried farther to large receptacles, where it accumulates. When these are full, the clay is removed and dried for export. In that state it is very white, and although not so plastic as the ball clay, contains a little more alumina and less iron, which accounts for its resisting much better the action of fire. It is principally obtained at St. Stephens and St. Austell, in Cornwall; Lee Moor, near Dartmoor, in Devon, and a few other places; the whole of them sending to the potteries about 130,000 tons annually.

From the same districts comes another granite, in a less advanced state of decomposition, called Cornish stone, which is used fresh from the mine without further preparation. In it the felspar retains its alkaline element, so that it can be easily melted, and is found a useful and cheap flux for the vitrification of the different mixtures. The composition of these rocks varies considerably, so that it requires constant experiments to determine in what proportion the quartz and the fusible parts stand to each other.

Flints are also largely used in the manufacture of earthenware. They are found abundantly in the chalk districts, the brown sort being considered the best. Under a moderate red heat they become white and opaque, and may be easily crushed between iron rollers. In that state they are placed in pans of water and ground by large stones of chert, till they become sufficiently divided to remain in suspension in the liquid without sinking and hardening at the bottom of the tanks, which, by the way, are called "arks." Flints are comparatively a cheap material, and their carriage to Staffordshire represents a large portion of their cost.

Such are the four materials essential for making earthenware. The respective quantities in which they are used vary in each manufactory, but the principle is always the same: the ball clay being the foundation, and flint the whitening material; but as an excess of this would make the body difficult to work, Cornish clay assists in making it whiter and less liable to break under a heavy weight or sudden changes of temperature. The Cornish stone is used in a small quantity as a flux, to render the ware more compact and of a closer texture. When the mixture of these materials is completed, the colour taken by earthenware when fired would not be a perfect white; the quantity of oxide of iron existing in the clays, however small, would be still sufficient to impart a yellowish tint, particularly after the glazing of the ware. This is counteracted by the addition of a small quantity of oxide of cobalt, the power of which over the iron, as a staining material, is such as to neutralize it completely; the result, in fact, being the same as that obtained by washerwomen, who use blue to the linen with the object of making it look white.

From the moment that the materials are extracted, to the time when the goods are perfected, the number of distinct operations to perform is so great, that I can only give a summary description of the most important. The grinding of those materials which are not already in a fine state of division is one of the most essential, for upon it depends the soundness of the ware, and without it the difficulties of workmanship would be greatly increased. It must be so perfect, that when the different components are put together in the slip state, they should mix readily and form a homogeneous compound. The grinding for the use of potters is a trade of itself; but good quality is of such importance, that the manufacturers who can afford it prefer having mills of their own. In these, the different materials are ground in water in separate pans, till they can pass freely through fine silk lawn, and are afterwards stored in distinct reservoirs, and the excess of water removed, so that a quart measure of each should weigh a determined number of ounces. As the potter knows beforehand the proportion of solid matter contained in each liquid measure, it only remains for him to count the number of quarts or gallons which must be introduced into the body of the ware. This being done, the liquid mass must be deprived of its superabundance of water. Till lately it was the custom to effect this by running the slip 10 or 12 inches thick over the surface of long kilns, paved with bricks and provided with flues underneath. The heat which was maintained in these, assisted by the porous nature of the bricks, was sufficient to bring it to the proper state of toughness; but the kilns could not be filled more than once a day, and required besides a large quantity of fuel, much of which was wasted in the form of dense smoke. Now, thanks to the new apparatus of Messrs. Needham and Kyte, the same result is obtained with great saving in space, time, and fuel.

The process is simple, and easy to manage. As soon as the final mixture is sifted, the slip is directed to a well, whence it is raised by an hydraulic pump and sent to the presses, which are composed of a variable number of large wooden frames. These are closely ribbed on both faces, and, when placed side by side in a vertical position, they leave in the middle an interval of about three-quarters of an inch in thickness. Each of these hollow compartments is lined with a sheet of strong cotton stuff, folded in such a way as to form a bag, in the middle of which a small metal fitting passes through the upper part of the frames, and forms the spring by which the slip can be admitted into the interior. When the bags are tied together, the slip is admitted into their interior and submitted to such pressure from the pump, that the water filters through the interstices of the stuff, and escapes by the small intervals left between the ribs of the frames. After allowing a sufficient time for the action of the pump, the presses are dismounted, and the solid clay is found in the middle of the bags, ready for use in the various departments.

The processes for shaping the different articles are many. For the more expeditious preparation of the wares, it was necessary that each workman should devote the whole of his time to a special branch of his art. For this reason we have several classes of potters, called according to their avocation: throwers, turners, handlers, hollow and flat ware pressers, figure and ornament makers, tile makers, modellers, mould and sagger makers, besides those who are employed in the decoration of the goods.

Of all these various branches, the most attractive for those who are witnessing it for the first time, is the throwing; and it is a source of amazement for them to see how quickly, in the hands of the potter, the same lump of clay can be transformed in a variety of ways.

The potter's wheel is of great antiquity. In some Egyptian hieroglyphics from the tombs of Beni-Hassan, known to have been made during the twelfth dynasty, the different occupations of the potter are painted with great distinctness. In one of these, two potters are using the wheel for making their vessels – implying that this contrivance has been in use for something like four thousand years. The forms and proportions of the wheels may be varied without altering the principle. A spindle, finished at its lower end in the form of a pointed pivot, is placed on a hard substance on which it can easily revolve. The upper end is furnished with a wooden head or small platform, on which the lump of clay is to be placed, and between this head and pivot is fixed an horizontal wooden disc of large diameter, which acts as a fly-wheel and keeps the spindle in motion for a certain length of time. The motion may be given by the hand, the foot, or mechanical power, which causes the spindle to revolve with great velocity. A good thrower requires a great deal of practice, as he is expected to throw several hundred pieces a day, although the art is far from being what it was in the olden times. In consequence of the new plan of pressing all large pieces in plaster moulds, the thrower has but small or moderate size pieces to work, and these he finishes only in the inside, leaving the outside to be done by the turner, when the pieces are in a more advanced state of dryness. This division of work, brought about by the exigencies of the trade, is very much to be regretted, for the old thrower was really an artist, who could impress his feeling on the work which was entrusted to him from beginning to end. He has not now the same opportunity of showing his skill, and cannot take in his work the pride and interest which he would have felt, if circumstances had not been altered. The same may be said of the turner, who finishes the outside on a lathe like that used for turning wood. The thrower prepares the pieces of a thicker bulk than is required, and it is the turner's business to bring them to a proper thickness, by removing the excess of material and giving to the exterior a smooth and highly finished surface. If the handles are ornamented, they are pressed in plaster moulds; if plain, they are squeezed from a brass cylinder, filled with clay, with a small aperture at the bottom, from which it escapes under the pressure in long ribbons. These are placed side by side on a board, cut across at the required length, and bent in the form of handles when they get sufficiently hard. They are afterwards fitted, and made to adhere to the pieces by means of a little water or slip dropped from the point of a brush.

Flat pieces, such as plates, dishes, saucers, and the like, are made in plaster moulds, on which a bat of soft clay is tightly compressed by a hand tool, called a polisher. The process is very expeditious, although the presser is obliged to repeat the operation, to give more pressure and finish. For this kind of ware, the potter's wheel called a jigger, is simplified so far, that the iron spindle resting on its point and fixed to a bench, is provided only with a round plaster head on which the moulds are placed. The presser keeps this in motion with his left hand, whilst with the right he guides the polisher.

In those manufactories which have adopted the latest improvements, the jiggers are worked by steam power, and the stoves in which the pieces are sent to dry are heated by steam pipes. These are constructed on a new principle, consisting of a number of shelves which revolve round a central spindle, so that by a gentle push of the hand, each section is successively brought in front of the door, giving the opportunity of removing or putting in the moulds. This simple contrivance does away with the necessity for the assistant boy entering the stove, and feeling the bad effects of the heat.

When the pieces are not exactly round, and cannot be thrown or pressed on jiggers, it is the custom to have them made in plaster moulds, which have been cast on models prepared for the purpose. As long as the clay keeps soft, it takes the shape of any hard substance against which it is pressed, and for that reason, plaster, which has the property of absorbing moisture readily, is preferred. The use of plaster for moulds is comparatively recent, and although its properties were known in early times, there is no evidence that it was ever employed for that object. Greeks, Etruscans, and Romans, had their moulds made of fired clay; the Chinese, in raw clay thoroughly dried. In

Staffordshire, before the use of plaster, they were made of fired clay or metal; but plaster is more economical than any of these, although moulds made of this material do not last long, and require constant renewing.

The making of moulds, well adapted for pressing the various shapes, is a very important part of the potter's business. They must allow of a certain amount of contraction, and, at the same time, must easily dislocate without pulling away any part of the piece, which is still sufficiently soft to be distorted by careless handling. Some pieces will require moulds made in one or two parts; others, a large quantity of them, the various fragments being in that case pressed separately, and carefully put together afterwards. The pressing is done in this way: the potter begins to flatten a lump of clay in the form of a bat, and transfers it to the inside of the mould; then, by the repeated blows of a sponge in his right hand, he compels the soft material to take the exact form of the mould, and, of course, of any ornamentation which may be on its inner surface. A good presser ought to be systematic in his work, and not to apply more pressure to one part than to another, otherwise the different portions of the pieces would not contract alike, and would be liable to show an irregular surface, or even crack in the drying or firing processes.

For several reasons, there are pieces which cannot be pressed: they may be required very thin, or their shape is such, that the potter cannot reach all the parts to take the impression conveniently. In this case he must adopt the following plan. The mould is tied up, and filled with liquid clay through an opening left in the top. The plaster rapidly absorbs the water, and a deposit of solid clay adheres to the surface. This soon increases in thickness; and when the potter thinks it is sufficient, he pours out the slip which is in excess. The piece soon hardens, and when it begins to contract, it is then time to remove it from the mould. This process has the advantage of giving a uniform thickness, and as there is no other pressure than that caused by the absorption of the plaster surface, there is a better chance for the piece to contract equally, and on this account this method (called *casting*) is preferred for articles which require a neat execution. In some cases it is cheaper than ordinary pressing; but the drawback is, the excessive contraction or diminution of bulk to which the ware thus made is subjected. An irregular contraction is the source of most of the defects attending the ceramic manufacture, and it is worth explaining the causes, of which there are three. I have already mentioned that natural clays, which have remained in a damp soil for ages, contain materials in a hydrous state, i.e. combined with water, which sometimes increases their bulk considerably. These are unstable compounds, and may be destroyed by thoroughly drying them. Some other materials used in pottery may be artificially combined with water, as would be the case, if ground in it for an unnecessary length of time. The second reason is, the interposition of the uncombined water between the solid particles of the clay, and as this cannot be worked without it, this cause of shrinking cannot be avoided. It will be easily understood, that when the water in the mixture evaporates, the solid particles, under atmospheric pressure, will move to take its place, and this effect will continue as long as they find enough moisture to assist in their free motion. The consequence is, that the mass shrinks more and more, till the contraction is stopped by the inability of the particles to move farther; and this happens before the pieces are completely dry. From that state to complete dryness, the evaporation of the remaining water will leave small holes, which will make the texture of the ware porous, and prone to absorb any liquid with which it may come in contact.

The shrinkage in the raw state then is mechanical, and distinct from that which takes place in the oven under the influence of heat. Under this agency the particles enter into combination, and if the process is carried far enough, the ware may become partially vitrified and acquire a certain amount of transparency. The more perfect the vitrification, the closer will be the contact of the particles, and consequently the greater the diminution of bulk. From these causes, the total contraction may vary from one-sixteenth to one-fifth of the original model. The least will belong to ware pressed with stiff clay gently fired; the greatest, to that cast with liquid slip and brought to the vitrified state. In these last, the shrinkage is greater in height than in width, a fact explained by the weight of the upper

portions acting vertically to assist the closer contact of the particles in the under-structure, when the same opposes their free action in an horizontal direction. In making the models, care should be taken to bring the contraction to a common centre, or if there are several, to strengthen sufficiently the connecting parts.

After the drying of the ware, the next operation consists in placing it in saggers, which, as I have said, are made of common fire-clay, and of a form and size to suit the different articles which they are intended to hold. A certain thickness of flint or sand is placed at their bottom for the purpose of giving them a firm bed, and as it is the interest of the manufacturer to make the same firing answer for the greatest quantity of goods, care is taken to fill the saggers as far as is safe. The placing of the ware is done at the outside of the ovens, and when these are to be filled, the saggers are quickly arranged one over the other in columns, called "bungs," each sagger forming the cover for the one immediately underneath. A small roll of soft clay placed between makes them stand better, and at the same time prevents the ashes carried by the draught from finding their way into the interior, and damaging the contents.

In ancient times, the ovens, intended to hold few pieces, were very small; but as the potters became more experienced, the sizes were gradually increased, and now-a-days some of them are not less than 19 feet in diameter. The quality of fuel had, of course, a great deal to do with their mode of construction. Now, however, that coals are acknowledged to contain more heat, and to be cheaper than wood, the ovens are generally built in a cylindrical form, with several mouths or feeders disposed at equal distances on the outer circumference, the upper part being covered by a semi-spherical dome or vault, to keep the heat inside and reverberate it downwards. This construction is very simple, the only complication being in the arrangement of flues under the bottom of the oven, so as to throw into that part a portion of the heat, which otherwise would be liable to accumulate towards the top.

The firing must be conducted very slowly at first, to prevent a too sudden evaporation of the damp, which would cause the splitting of the goods. This being done, the heat is raised gradually, care being taken to feed the mouths with fuel as quickly as it is consumed. It requires an experienced fireman, to see that one part of the oven does not get in advance of the other. He manages this by throwing in a certain quantity of air through small openings in the brick-work, which are shut or left open according to circumstances. Whatever may be the construction of the oven, the quantity of air mixed with the gas produced by the combustion of fuel causes the atmosphere to be reductive of oxidizing; which means that the different materials submitted to the heat would, in consequence of an abundance of carbon, have a tendency to be deprived of their oxygen and return to a metallic state, or that by firing in presence of an excess of air or carbonic acid, they would be kept in a high state of oxidation. It is fortunate that all classes of English pottery, without exception, require, or are not injured by, an oxidizing fire, which is the most economical way of firing, since by it all the gases are completely burnt inside the oven without any waste of fuel. By a better application of this principle, Messrs. Minton have introduced a new oven, in which the fuel is so completely utilized, that it requires only one half of the usual quantity of coals, besides doing away with the dense smoke, which is the annoyance of the district.

By the first fire to which it is exposed, the ware is converted into what is termed, from the French, *biscuit*– an incorrect name, as it seems to imply that it has already been fired twice, when, in fact, it has been only fired once. Some classes of pottery do not require more than a single firing, as, for instance, the common terra cotta and stoneware. However, for all our English ware it is necessary to have two fires, for the following reasons: First, the necessity for getting a denser texture of the ware by submitting it to a strong heat, lest the glazes which are to be melted on their surface, and which thereby become very dense and most contractible, should not agree with the more open texture of the body, and should crack or craze when exposed to changes of temperature. Secondly, that for coating the ware with the glaze, it is necessary to dip the article in the vitreous mixture finely ground, and kept in suspension in water; consequently, if it were in the raw state when this was done, the adhesion

of the particles would be so small, that they would readily dissolve in the liquid. It is customary, therefore, to expose the goods first to a hard fire, which, according to the size of the ovens and the quality of the ware, may last from forty to fifty hours.

From the biscuit oven, the goods, if they are to be left white, may be sent to be glazed; but if they are to be decorated with a printed pattern, they must be forwarded to the printing department. Printing on pottery is comparatively a modern invention, its chief advantage being the cheap rate of production. Up to the last century, the goods were always painted by hand: a slow, but it must be confessed, a more artistic process, as the work executed in this way, even of an inferior kind, will exhibit a freedom of touch and facility of execution, which will make it attractive and preferable to the formality of a printed pattern, however rich or complicated it may be. This superiority is sufficiently illustrated by comparing monochrome patterns of Italian majolica, Delft, and Chinese, with the modern printed ware of the same colour.

Public taste has so wonderfully improved lately, that, for my part, I have no doubt that we shall soon have a special class of artists trained to execute, by hand, cheap and simple decorations for those purchasers who are not satisfied with printed decoration.

To what extent the introduction of printing on pottery has hindered the progress of art education in Staffordshire, is a question on which people may entertain different opinions; but we might ask, what amount of artistic work we might not do, if at the present time we had some hundreds of artisans trained from their early years to that style of painting? However that may be, the process of transferring printed patterns to biscuit ware was considered a great step, and one which contributed largely to the extension of the earthenware trade.

Liverpool and Worcester claim the priority for this invention, towards the year 1752. It is a fact that shortly after that date, Staffordshire potters used to send their wares to Messrs. Sadler and Guy-Green, of Liverpool, to be printed; and there is also every reason to believe that about the same time it was introduced at the Worcester works, then under the management of Dr. Wall, by an engraver named Hancock.

The process of printing on pottery does not differ very materially from that used for transferring to paper a design from an ordinary copper-plate. There are, however, these differences, that a metallic colour is used instead of lampblack, and that a fine tissue paper is specially made for that purpose. When that paper, with the pattern printed upon it, is laid on the ware, face downwards, the colours adhere strongly to the biscuit, which, being porous and aluminous, has a great affinity for the oil with which they have been mixed. After rubbing the back of the print with a roll of flannel, to secure the adhesion of every portion of the pattern, the biscuit piece is plunged in water, and the paper comes off quite freely, the whole of the colour sticking fast to the ware.

Previous to glazing, the printed ware must be brought to a red heat, for the sole object of burning the oil mixed with the colour. This is done in kilns, called *hardening-on kilns*.

The colours in use for printing under the glaze are not many; as few only of the preparations made with metallic oxides can, when brought to a red heat, stand the action of the glazes under which they are laid. Most of them in this case will be dissolved and considerably weakened, if they do not even completely disappear. Cobalt, and the preparations made from chromates, are the most resisting, and, when well prepared, the glaze in melting over them will bring out the colour with increased beauty.

The necessity for covering the biscuit with glaze to stop the absorption of liquids or greasy substances, which would find their way into its interior and would stain it, is so obvious, that I do not think it necessary to dwell on the importance of this operation. I have stated already that it was used by the Egyptians and Assyrians, who knew most of the saline mixtures by which white and coloured glazes could be obtained; but these, which for the greatest part were alkaline silicates, could not have resisted the action of time as they have done, if a certain amount of silicate of lead had not made them permanent. They found this material in the sulphide of lead, which by the silica it contains, or

that which it meets on the body of the ware, gives a glaze, which stands exposure to damp better than any other. That this mineral was used in remote antiquity, proofs are numerous. I recollect, amongst others, some small shalti, or sepulchral figures, made in Egypt more than two thousand years ago, of which the red parts, such as the faces and hands, have been glazed in this way. My opinion is, that it was used by the Greeks, in connection with the black oxide of iron, to produce the black colour used in the decoration of their vases, and it might some day prove that it was an indispensable material in the preparation of the red smear, which is the characteristic feature of the Samian ware. At all events it is with this single material, stained with metallic oxides, that the Arabs glazed their rich-looking pottery, and the same was used afterwards for our encaustic tiles and our common pottery, from the time of Elizabeth down to the middle of the last century. Lately, however, the science of making glazes has considerably improved, and a variety of new substances have been introduced. To prepare a glaze is one of the most delicate operations possible, and failures are attended with most serious consequences. The conditions to be fulfilled are many. It must not be too fusible nor too hard, either of which conditions would make it dull or apt to craze; and it must be transparent, otherwise the colours underneath would not be clear. It may happen that a glaze which apparently seems good when it comes out from the oven, will craze when a few months, or perhaps years, have elapsed. Generally, the less alumina that there is in the biscuit, the easier is the adaptation of the glaze, and this accounts for the soft porcelains being easier to manage in this respect than ordinary earthenwares.

The materials used for the *foundation* of glazes are in principle the same as those for the body, viz. silica, in the form of flint, or sand and felspar, pure or mixed with other components in the granitic rocks, called Cornish stone. These are the hard materials to be vitrified by the fluxes, which are carbonate or oxide of lead, boracic acid or borax, potash or soda, carbonate of lime or barytes. There is no definite receipt for mixing, and they may be combined in a variety of ways. Every manufacturer has receipts of his own, and I must say that some make their glazes a great deal better than others. They are rather expensive, chiefly owing to the increased price of borax, a material of comparatively modern use, which, being apt to promote the brilliancy of the wares and the beauty of the various colours, is now extensively used. When the components of the glazes are not soluble in water, it may be sufficient to have them finely ground in water. But if any soluble salt, such as borax, nitre, or soda, is employed, it is necessary to render them insoluble, by vitrifying them together with other substances. This may be effected in crucibles, or, still better, in reverberatory furnaces, where a large quantity may be melted more conveniently. In this case, when the mass is well liquefied by the intensity of the heat, it is run into cold water, which, cooling it suddenly, causes it to break into small fragments. This is called a *fritt*; and when it is sent to the mill, any other insoluble material may be added to it if necessary. To lay a thin coat of glaze on the surface of earthenware, is a most expeditious process. Advantage is taken of the porous nature of the biscuit, which, being dipped in the liquid slip, rapidly absorbs the water, while the solid particles of the glaze, which, however fine, could not follow the water to its interior, are found coating the surface. As the pieces are removed from this bath before the pores of the clay are saturated with water, they are seen to dry almost directly.

After this, the last operation consists in firing the pieces a second time, to give them that neat and finished look which belongs to glazed substances. The saggers, ovens, and the mode of conducting the fire do not differ in this case from those used for making biscuit. The ovens are, however, smaller, and the saggers cannot be packed so closely with the different articles, as every piece has to be isolated, otherwise the glaze in melting would cause them to stick together. To provide against this, small implements made of clay cut in different forms are used, and, not to disfigure the ware, are contrived in such a way that the points of contact between them and the pieces should be as small as possible. This second firing does not take more than fifteen or eighteen hours, and this completes the series of operations, by which ordinary earthenware sold in the white or printed state may be produced. The reader must understand that the majority of these processes are also applicable to the

manufacture of china, or any other glazed pottery, with some modifications which I shall take the opportunity of noticing, when speaking of these varieties.

Pottery may be decorated in a great number of ways, and the operations are so varied that I cannot describe them all intelligibly, should I attempt to do so in my limited space. I shall consequently speak only of the paintings executed on the surface. This necessitates the use of colours specially prepared and made from two distinct materials; the bases and the fluxes. The bases are generally metallic oxides or highly oxidized compounds; the fluxes are vitreous substances, similar to the glazes, but softer, whose function is, to fix the colours permanently on the ware. When both, after being intimately ground together, are fired at a moderate heat on the article, the fluxes will cause the colour of the bases to look more vigorous and brighter, the effect being rather similar to that of an oil or transparent varnish on ordinary body colour. For this object, they must have very little chemical action, and be sufficiently soft to act in a moderate quantity. If, by carelessness or accident, the temperature is raised to a degree higher than the one exactly required, new compounds are formed, and the alteration of the colour is the consequence. There are some instances in which no fluxes are required; this is the case, when the ware has been coated with a glaze sufficiently fusible to allow the bases to sink in it, as soon as it begins to soften under the influence of heat. By this process more force and effect are obtained. It is, however, seldom used, for this reason, that from the care and attention which it requires in the superintendence of the firing, the manufacturer would run greater risks, and, being unable to use large ovens, would not turn out the same quantity of ware. Altogether it is a very expensive process.

Modern chemistry has placed at the disposal of colour makers new compounds which have made the preparation of fluxes comparatively easy. At the present time two classes are required: those in which the oxides of lead predominate, and those chiefly made with borax, which on account of its great purity is used in almost every flux, and is of great service for those colours which, like the pinks and purples, would suffer from the presence of lead.

The preparation of painting colours is a little more complicated, and each requires a different treatment. The number of those found in the trade is rather large, and each artist has his favourite maker. In this, as in any other kind of painting, beginners are apt to think that they will be assisted by the use of a great variety of tints, when they will learn by more experience, that a very limited number is sufficient. I cannot undertake to give any receipts for those who might wish to prepare these themselves; I only mention the name of the substances necessary to secure each of the essential colours.

White is not a colour, but when wanted on a coloured body, it is procured by an enamel prepared with the oxide of tin. Light yellow requires the oxides of lead and antimony. Orange will require the same, with an addition of deutoxide of iron. The hydrate of peroxide of the same metal will give a golden buff. The subchromate of lead gives a very bright red, but it is very unsafe and mixes badly; the reds made by calcining the common sulphate of iron are preferred. From this, according to the degree of fire, all shades of red may be got, from an orange red to a deep purple brown. The pinks, purples, and crimsons are made from the precipitate of cassius; this is obtained by pouring a weak solution of tin in the chloride of gold. The dark blue is a triple silicate of cobalt, which, by the admixture of the white oxide of zinc, may be converted into a brighter blue. The green oxide of chrome is the base of all greens, the tint of which is modified by cobalt for the blue greens, and antimony for the yellow greens. The chromate of iron, a mineral coming in large quantities from South America, is the base of all browns. The black may be got from the mixture of various oxides, but the best is that made from the oxide of iridium. Besides the above, there is another class of colours in which the oxides are thoroughly combined with the fluxes, such as the greens made from copper and the transparent blues, which are ground colours, and must be classified with the glazes. When painting colours are fired with their respective fluxes, they are very permanent, and will not only resist ordinary atmospheric influences, but also the action of every gas or mineral acid (the fluoric excepted). This seems an

advantage in favour of painting on pottery, and one which ought to give them an additional value; in reality, however, artistic merit ranks above all other considerations, and unless the work is original, connoisseurs in pottery will hardly take this into account.

Several oils possessing drying properties, such as those of lavender, aniseed, or turpentine, are mixed with the colours, which, from the fact of containing vitreous substances, would work badly; even with their assistance, it requires a certain amount of skill to master the process. We must not make too much, however, of this difficulty, generally exaggerated by the ignorance of apprentices in what constitutes the very principles of their profession. When parents, in perfect ignorance of the abilities of their son, have decided, after putting their heads together, that he shall be a painter, sometimes for no other consideration than that they can get him admission into a porcelain manufactory, or that this is the nearest to their home, the boy has not the least notion of what is before him, and hardly knows that he will have to learn that very difficult thing, drawing. No wonder then, if his deficiency in this will not allow him to produce, we will not say good, but saleable paintings, unless he has spent a dozen years on his trial. On the contrary, to one well prepared by the study of art – one who, before he sets to his work, has a clear conception of the effect which he wishes to produce – the process will not stand in the way, and he will master it in the course of a few weeks.

To induce talented men to devote their time to the decoration of pottery, is perhaps the greatest difficulty met with by our leading manufacturers. As long as the making of the ware only was concerned, they had to call for the assistance of practical men, such as potters, chemists, or engineers, the number of whom is fortunately great in England, and whose services can be secured by money. The same thing is not so easy in the matter of art. Up to a recent date, painting on pottery was not considered as the high road to fortune, and artists preferred to try their chance in oil or water-colour painting, fully aware that they would have to fight against an army of competitors, and to be satisfied with very small incomes, unless, by their, then problematic, genius, they could cut their way to the front. Since, however, the rage (there is no other word for it) for well decorated pottery has spread in almost every class of society, the prices paid for good work are more remunerative, and artists like Solon, Mussill, and Coleman, can make artistic pottery their special business.

Royal Academicians like Poynter and Marks have thought it not beneath them to prepare cartoons for Minton, and it is probable that others would follow in the same path if, with the assistance of our chief potters, they could be initiated into some of the mysteries of the craft. No doubt they would find the study attractive, and there is no fear that, having once begun, they would not keep faithfully to it. For myself, I know of no such example.

In addition to the painting colours, there are a few metals which are used to enrich pottery; unfortunately, the number of those which can undergo exposure to a red heat without oxidizing is very limited. There are only three, viz. gold, silver, and platinum, which can stand it, and, among these, silver is of little use, on account of its proneness to tarnish under the action of sulphurous gases. Gold, on the contrary, affords to the decorator one of his greatest resources. We cannot say when the Chinese began to use it; we only know that in Europe it was thought a great discovery, when, in the sixteenth century, it was used in the Italian majolica. From that time to the introduction of hard and soft porcelain in Europe, it was rarely and sparingly used; and it was at Meyssen, soon followed by the other continental and English manufactories, that they began to use it extensively. At the present time, its annual consumption by our Staffordshire potters alone represents a very large sum of money. There are several ways of preparing gold for pottery purposes; the oldest consists in grinding gold leaves on a slab, adding to it gum water, honey, or any other mucilaginous liquid. This laborious process surpasses all others; it has a very artistic effect when used thin, in the Chinese fashion, and, when laid thick, as we find it in the Old Sèvres ware, it answers beautifully for chasing; the only drawback is the expense. The most usual way is to have it amalgamated with mercury, and afterwards ground in turpentine; it has then the appearance of a blackish substance, which will regain its colour, as soon as the mercury is volatilized by the application of a gentle heat. When it comes

out of the kiln, the gold is dull, and requires to be burnished with agate and bloodstone tools, to be in possession of all its brightness.

There is another decorated pottery, called lustre ware, now out of fashion, but most successfully executed at one time by the Moors, the Persians, and the Italians on their respective majolicas; the glaze of this ware being more favourable than any other for the display of the process. It simply consisted in painting over the fired ware with the protoxide of some metal, such as that of copper, taking care that from the moment the kiln began to get to the red heat, a constant supply of thick smoke should be kept up. The partial reduction of the metal which adheres to the surface has a very pleasing effect, as may be noticed in the large Hispano-Moresco dishes, considered the finest specimens of this class. Those produced in Italy by Georgio Andreoli fetch, however, a higher price, on account of the redness of their colour; the process is fully described in the celebrated manuscript of Piccolo Passo, now in the library of the South Kensington Museum. Lessore, the French painter, lately dead, and M. de Morgan, in London, have succeeded in producing very fair specimens of that kind. Some of our Staffordshire potters can make another lustre by mixing chloride of gold with lavender oil, sulphur, resin, and other carburated ingredients, and laying this mixture very thinly on the surface of the glazed ware; the iridescent pinkish colour which it takes when it is fired in an ordinary kiln is rather peculiar. This has no connection with the old process, and is only used for the commonest kind of goods.

The kilns in use for firing the painted or gilt ware, are called muffles or enamelling kilns; they are in the form of a D, laid on its straight side, and of a length proportionate to the size and number of pieces which they are to hold. The fireplaces are arranged on one of the sides, and the flues contrived in such a manner, that the flame should travel round the whole of the outer surface, great care being taken that it should not have access to the interior through any cracks or joints which might exist in the brick-work. For ordinary goods one firing may suffice; for those highly decorated, as many as five or six may be necessary.

Let me now say a few words respecting the various wares produced by our English potters.

The first earthenware made after the time of Wedgwood and Josiah Spode was far from being so good as that made at present, and several attempts were made to bring out a pottery which should be intermediate between earthenware and porcelain. The most successful was that made by Mr. Mason, of Fenton, who, in 1813, took out a patent for an ironstone china, the body of which was fluxed by the scoriæ of ironstone and the ordinary Cornish stone. But eventually this last was found sufficient for that purpose. The name of ironstone remained to that class of pottery which is strong and resistive. Since then, however, earthenware has so much improved, that ironstone has gone out of fashion; the nearest to it is the ware called *white granite*, made for the American market, which is richly glazed, and made thick to compete with the French hard porcelain, which is also exported to the United States for the same class of customers. About fifty manufactories are specially engaged in producing this ware; and those in the occupation of Messrs. Meakin, Shaw, Bishop and Powell, and G. Jones, may be considered the largest. The best earthenware is made for the home market, some of which is so perfect that, if it were not opaque, it might be mistaken for porcelain. When it is richly decorated and gilt, like that made by Messrs. Minton, Wedgwood, Furnival, Copeland, Brown-Westhead, Brownfields, and several other leaders of the trade, very high prices are obtained for it.

Some of these makers do not devote all their attention to earthenware, but produce other classes of pottery. Amongst the sorts which are most connected with earthenware are majolica, Palissy, Persian ware, and flooring and wall tiles. I have given the name of majolica to that class of ornament, whose surface is covered with opaque enamels of a great variety of colours. It is only connected with the Italian or Moorish in this respect, that the opacity of the enamels is produced by the oxide of tin; but as we have not in England the calcareous clay for making the real article, we have been obliged to adapt, as well as we could, the old processes to the materials at our disposal.

At present, English majolica is very popular, and without a rival for garden decoration, as it stands exposure to the weather better than ordinary earthenware, besides the impossibility of the latter receiving the opaque enamels without crazing or chipping.

Majolica was produced for the first time by Messrs. Minton, in 1850, and they have been for many years the only producers of this article. It is only five or six years ago that Messrs. Maw, of Broseley, in Shropshire (and very lately the Worcester manufactory), have made a pottery of the same kind. The name of majolica is now applied indiscriminately to all fancy articles of coloured pottery. When, however, it is decorated by means of coloured glazes, if these are transparent, it ought to be called Palissy ware, from the name of the great artist who used these for his beautiful works. Messrs. Wedgwood, George Jones, and a few other makers of less importance, are reproducing it more or less successfully. To Messrs. Minton, however, we owe the revival of the ware, which, in connection with their majolica, created such a sensation in the French International Exhibition of 1855; and credit must be given to those gentlemen, for being on that occasion the promoters of that demand for artistic pottery, which has so largely developed of late. It is to satisfy this craving for novelties, that they have undertaken the imitation of the faïence d'Oiron, better known by the name of Henri Deux ware, a rare and costly one, which can only be produced in small quantities; and also their most recent improvement, the reproduction of the Persian wares.

Конец ознакомительного фрагмента.