ENAMEL AND ENAMELERS: M. P.-VERNEUIL. TRANSLATED BY IRENE SARGENT

BEFORE advancing to study the productions of modern workers in enamel, we must pause to devote a few considerations to the same art as practised in the past. But the retrospective glance needs only to be brief.

Cloisonné Enamels.

These may be regarded in their origin as the simplification, by means of a flux, of work executed by the lapidary, who encrusted table-cut stones in gold settings, thus forming a kind of mosaic. Such specimens of enamel are the most ancient known. Cloisonné enamels were produced by the Egyptians, and again, after an interval of long ages, by the Byzantines, who practised the art from the sixth century onward, and, in their turn, transmitted it to the craftsmen of western Europe. In France, Germany, Italy, perhaps even in England, cloisonné enamels were executed from the ninth to the twelfth century. Subsequently, this costly method was largely abandoned, except by jewelers. These artificers continued to produce cloisonné enamels down to the sixteenth century. The work was usually executed upon gold or silver, more rarely upon copper, and, in exceptional cases, upon iron.

We may regard the filigree enamels, which were executed from the fifteenth to the seventeenth century, in Hungary, and throughout the valley of the Danube, as an extension of the previous method. In the later process, the cells or partitions are replaced by filigree, and the enamels are not subjected to polishing.

Champlevé (sunken) Enamels.

Specimens of this class have been known since classical antiquity; they have been found in Italy, France, Germany and Great Britain; all apparently dating from periods prior to the third century of the Christian era. This method seems to have been abandoned during several hundred years. The first examples, belonging to the West of Europe, are not earlier than the ninth century. They are executed upon gold, and appear
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to be a simple modification of the cloisonné process.

The metal employed in the champlévé (sunken) process has largely been copper of considerable thickness.

This process offers most varied results, according as plain spaces of metal are reserved for the figures, or as, inversely, the figures are enameled, and thus relieved against a gold background. The craftsmen of the Rhineland and the region of the Meuse, in the twelfth and thirteenth centuries, the enamellers of Limoges, in the twelfth, thirteenth and fourteenth centuries, obtained excellent decorative results from these processes, which were sometimes united in the less important parts, even in enamelling upon copper, with the cloisonné method.

Translucent or transparent enamels have scarcely been employed, except for the decoration of the precious metals, gold and silver.

From a technical point of view, the first translucent specimens do not present marked differences from the champlévé enamels; since the former were first employed to decorate backgrounds; the ornamental motifs and figures being reserved in plain metal. Afterward, the craftsmen conceived the idea of extending this system to the entire surface of the object, and for the purpose of applying transparent enamels, they were led to make true bas-reliefs whose slight elevations are seen through the transparent medium of variously colored enamels.

This system, which was known in Italy at the end of the thirteenth century, was simultaneously employed in France and in Germany for the decoration of pieces of goldsmith’s work in gold and in silver. It was never abandoned, and the jewelers and makers of caskets of the eighteenth century used it in their work.

In the class of translucent enamels, must be included the specimens of perforated cloisonné, produced in France as early as the fourteenth century, but which are extremely rare. These enamels, once finished, appear like painted windows, into the mass of which metallic partitions have been plunged. We have no information upon their special composition and treatment other than that given by Benvenuto Cellini:

Within an iron frame, having the shape of the enamel to be produced, the craftsman deposited with a brush a thin layer of earth, in order to prevent adhesions of the enamel. Then, he placed inside the frame the design composed by the aid of small metal plates, as is the case in the production of cloisonné. He next applied the enamel, as in the cloisonné process, and, after a certain number of firings, he obtained a kind of glass, very
thick, and easily detached from the iron frame which had served the purpose of a mold,—but a mold to which the enamel did not make the slightest adhesion. Such enamels could afterward be set, like precious stones, in pieces of jewelry, or in objects of church ornament and service.

We shall not longer insist upon the history of enamel. We have, in the present article, principally to occupy ourselves with technical methods and modern artists. Within these limits we shall find material sufficient for treatment.

Favored above all other artists, the worker in enamel deals with an admirable material into which he may translate his thoughts. To strength of tone and beauty of substance, enamel adds the rare and very valuable quality of resistance to the destructive agency of time. The truth of this statement is attested by the many antique enamels extant.

This beauty of material, this wonderful resistance to time, Théophile Gautier, the poet-author of “Enamels and Cameos,” praises in a sonnet dedicated to Claudius Popelin, a master-worker in enamels:

With a swift hand and rude does Time efface
Of art the forms which perish, though divine:
Confused now stands Da Vinci’s flowing line,
And shadows lessen Monna Lisa’s grace.
Our eyes have seen what soon shall fade from sight:
The Papal Halls a ruined Sanzio hold;
While Angelo’s stroke succumbs to muck and mould;
Greek art is lost; the Italian bears its night.

But thou, my Claudius, thou dost fix thy thought,
As amber holds a flower, in substance strong,
Defying all Time’s slow, insidious wrong.
Thy work the rainbow rays has sought;
From out clear depths burns bright the fleck of gold,
And the Ideal shoots forth its arrow bold.

What joy for the artist to work in such a substance! What joy also to gain a victory over fire, the necessary, but too often terrible auxiliary of his work!

Certain artists working in modern jewelry have reinstated this too long neglected substance. But the public perhaps does not clearly understand either the difficulties which the artists have overcome, or the processes which they have been forced to employ in order to attain fine results. These we shall here attempt to indicate; not limiting our study to the simple enameling of jewels, but extending it rather to the work of artists who make the value and interest of their productions dependent upon enamel alone, who use this medium as sufficient and complete in itself; executing under these conditions a fine piece of cloisonné, or of painted enamel.

We shall examine these processes or methods in succession; preceding them, however, by general truths applicable to all of them.

All metals do not receive enamel with equal susceptibility; certain of them can not be submitted to the process. Gold, silver and copper, with their various defects and
qualities, will alone constitute the subject of our study. Platinum, bronze and iron are of more difficult and less frequent use.

Gold is the metal best adapted to the purposes of the worker in enamels. It provides him with a medium brilliant and beautiful. Furthermore, enamels when brought into contact with it, do not undergo any regrettable change, as is too often the case with copper, and above all with silver. This we shall discover later, in examining these metals.

Whatever may be its alloy, that is to say, its degree of purity, gold easily receives enamel, but the proportion of nine hundred twenty parts of pure gold in one thousand of metal is the most usual combination. It is evident that with gold, as with the other metals, the degree at which enamels are fusible must be considerably lower than that peculiar to the metal upon which they are employed. The paste is usually produced at about eight hundred degrees.

The reason for the employment of gold in as pure a state as possible, is that the copper there existing as an alloy, as it becomes less and less in quantity, diminishes to the same degree the chances of failure.

In the process of enameling, the presence of an oxidizable element, like copper or silver, is much to be regretted, since reactions between such element and the enamels are always to be feared at the moment of the fusion of the latter. One of two results follows: either the enamel dissolves the metallic oxide produced in the metal by the rise of temperature, this oxide coloring the enamel, or modifying its original color-combination; or again, the enamel oxidizes the metal itself, and the oxide, thus formed, acts upon the enameling substance.

For this reason, gold enamels the more easily as it becomes purer, and the reactionary effect of the enamels upon the copper of the alloy are less to be feared.

Necklace: translucent enamel upon gold. Executed by Feuillatre

We have just learned what action occurs when enamels are brought into contact with oxidizable metals. This is the case with silver and with copper. But the color-
effect is often limited to the portion touching the metal. Therefore, opaque enamels are less influenced by these chemical facts than are the transparent pastes. Furthermore, the oxidizable metal can be isolated from the coloring enamel, and the latter be made to retain all its qualities.

Such are, then, the metals most frequently enameled. We have yet to study the processes of enameling and the composition of enamels.

Enamel is a vitreous substance, colored, or colorless, opaque, or transparent, which, being applied to metal and heated with the latter to a fixed degree, adheres perfectly to it.

Enamel offers to the sight three different aspects. It may be transparent, translucent, or opaque. When it is transparent, the metal beneath it can be wrought with excellent artistic effect. It is then that its employment becomes a task of extreme delicacy, especially upon silver; the defects and the stains resulting from oxidation being plainly visible. Translucent enamel is traversed by light, without, however, being made to reveal its interior substance. Finally, opaque enamel refuses all entrance to light, and its surface alone is visible. Each of these qualities may be employed by the artist according to the effect which he desires.

Let us now pass on to consider the composition of enamels. First of all, it may be said that the flux is nothing else than a colorless glass, serving as a common basis to all enamels, and to which the addition of certain substances communicates various color-effects, or even opacity.

It is evident that we can not here enter into all details of the composition of enamels, but we may at least briefly summarize this process.

Enamel, pure and simple, that is: the flux,—the colorless glass,—can be produced in various ways; the proportion of the constituent elements varying. We present several formulae: silex: three parts; red lead: two parts; azote of potassium: two and one-half parts;—or again: silex: three parts; red lead: five parts; azotate of potassium: one part;—still a third formula: silex: two parts; red lead: three parts; azotate of potassium: ten parts;—or a fourth formula: silex: two parts; red lead: two parts; carbonate of sodium or of potassium: one part. These proportions are for copper and gold; but if silver be employed, the susceptibility to fusion should be increased.

It is seen that the proportions differ according to the result sought. But it can not be too often repeated that the beauty of a work in enamel depends upon the correct constituency of the paste itself.

According to its constituency, an enamel is hard or soft: that is to say: it fuses at a
temperature more or less high. Of the two qualities, hardness is preferable, since the enamel possessing it, although more difficult of treatment, resists more perfectly the destructive action of the atmosphere. But it is plain that there is no necessity of using in the same work any but such enamels as fuse at approximate temperatures; just as it is evident also that, as far as possible, we should combine only those enamels which have a common base.

We have now procured our transparent enamel, our flux. We can color it at will by the addition in suitable quantities of metallic oxides, which we fuse with it. It is easily understood that, in proportion as the oxide is strong, the color-effect of the enamel is intense.

We here give a very brief table of the combination of various oxides with the flux, together with a statement of the colors which they produce:

Yellow—Flux: ten parts; chloride of silver: one to two parts. Or again: flux: four parts; oxide of antimony: one part. The oxide of uranium also gives a beautiful golden yellow.

Crimson—Flux: twelve parts; Cassian purple: one to two parts. Oxide of copper and chloride of gold also produce fine qualities of red.

Blue—Flux: ten parts; protoxide of cobalt: one to two parts. A combination of oxides of copper and cobalt in suitable proportions gives a turquoise blue.

Green—Flux: ten parts; sesquioxide of chromium: one or two parts. Or again: flux: thirty parts; black oxide of copper: one to two parts. The oxide of iron produces also a fine bottle green.

Violet—Flux: thirty parts; peroxide of manganese: one to two parts.

A combination of the oxides of iron and manganese gives black or brown, according to the proportions used. Other substances, other oxides are also employed which we shall not here mention.

It is well to note that the opacity of enamels is often desirable. It is easily obtained by adding a suitable quantity of stannic acid in the form of calcine. This form is obtained by fusing a mixture of one hundred parts of pure lead with twenty parts of equally pure tin.

The mixture is continually stirred, until the whole is changed into a dull yellow oxide, or stannate of lead. The oxide is then pulverized, washed, and purified from the non-oxidized metallic parts. It is now ready for use.

To render the flux opaque, it is only necessary to replace the red lead by a suitable quantity of calcine. Thus, for example, to every three parts of silex must be added five parts of the calcine obtained as we have just described, and also two parts of azotate of potassium. The flux thus obtained is afterward colored by the addition of metallic oxides.

We have now rapidly outlined the pro-
cesses of producing enamels, and we can not
here extend the description of this special
chemistry. For it is the art of using
enamel which we are here studying, and not
the art of producing it.

It is to be regretted that certain enam-
elers are easily satisfied by the ordinary com-
mercial pastes. Certainly these offer an
indispensable resource, but the sole use of
such limits the wealth of the palette of the
artist, which might be rapidly enriched by
research and perseverance. This fact has
been understood by certain workers, and the
results obtained by them have amply re-
warded their labors.

Having thus rapidly reviewed the compo-
sition of enamels, we shall now consider the
manner of employing them.

As they issue from the crucible, the
enameling substance is molded into cakes,
and in this state it is procured by art-
ists. It now becomes necessary to re-
duce these masses of paste to a form
in which they can be used: that is to
say, they must be subjected to grinding.

For this purpose an agate or porcelain
mortar is used, in which vessel the enamel,
covered with water, is placed. The mortar stands upon a
piece of thick leather, and the enamel is ground by means of
an agate pestle, struck by a
small mallet.

The enamel must be brought
to a very fine, but not an im-
palpable, state of powder, and
when finished, it should offer
the appearance of fine sand.
The process of grinding
should not be carried to ex-
cess, for, in this case, devit-
trification ensues. Devitrified
enamel can not be employed,
for the reason that it will not

The enameling substance brought, as de-
scribed, to a suitable pulverization, is now
copiously washed. It is decanted and then
washed anew in water tempered by azotic
acid. This double process is repeated until
the water rejected is absolutely pure. A
final washing with distilled water is very
desirable. The enamel, thus thoroughly
prepared for use, is now stored in flasks
filled with water.

It now remains to review the different
manners of employing the prepared sub-
stance. According to the effect desired,
and the result to be reached, the worker in
enamel has, at his disposition, several widely
different processes. These are: the cham-
plevé, the cloisonné (cellular structure), the
perforated cloisonné, and the basse taille
methods, and the means of producing painted
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enamels. We shall here consider the first three of these processes, reserving the remaining two for a future article.

The *champlevé* method consists in excavating in a sheet of metal small cavities, which, when filled with enamels of selected colors, form the design; the remaining metallic parts—gold, silver, or copper—forming the outlines and the details of the composition.

Following is the description of the process. The design having been traced upon the metal, and the thickness of the parts to be retained being precisely determined, the artist, by means of a graving-tool, surrounds these parts by a fine line incised in the metal. Then, with the aid of the gouging chisel, or burin, in the case of more extensive parts, he excavates to the desired depth the cavities which are to receive the enamels. It is needless to say that the deeper the cavities, the deeper will be the color of the enamels there inserted, since the paste will be thicker. This statement applies only to transparent compositions.

Often, in order to rough draft the work the artist has recourse to corrosions made by diluted azotic acid. To effect this result the metallic areas to be reserved are covered with a protecting varnish, as are also the under-surface and the edges of the sheet of metal. The acid corrodes the copper or the silver; subsequently the piece, having been rinsed thoroughly and freed from the varnish, is finished with the burin or the gouging-chisel.

The backgrounds can be wrought and thus present interesting areas, seen through the transparent enamel, when this effect is permitted by the nature of the paste. These parts can be either fretted by the lathe, or chased by the tool. In the latter case, strokes of the graving tool are given in order to form different ornamental motifs.

The metal is now ready to receive the enamel; the entire design reserved in relief. But first, the piece must be subjected to a searching cleansing process designed to free it entirely from all fatty or foreign substances. The following is the method of procedure: The metal is first heated in the oven, care being taken not to render it red hot, which temperature would destroy the life of the work and leave it without accent. Then follows the process of freeing it from grit, effected by diluted azotic acid; finally come soaping, rinsing and drying in the oven.

The *cloisonné* finished. Executed by Houillon

Beginning with this moment, the enamel can be safely applied, provided that the piece does not suffer the least contact of the fingers.
The enameler has previously tried his enamels, combined his color-tones, arranged his gamut. He therefore advances confidently and not led by chance.

Using small spatulas, he fills the cavities with moist enamels and selected colors. He have a somewhat extended area, must be pressed and leveled carefully by means of the spatula. Three or four layers are usually sufficient; the last being somewhat heavy, so that after the final firing the enamel slightly projects and overflows. This thickness is given to avoid the cavities which might appear after the polishing of the piece.

When a piece is to require a long time for the application of the enamels,—several days, for instance,—it is preferable to mix with them a slight solution of gum tragacanth. For the powders in drying, might mingle in spite of every precaution. On the contrary, the gum, causing them to assume a slight consistency, prevents this accident, which would destroy the work. In the firing, the gum is consumed, without leaving a residuum.

But another precaution is to be observed in enameling a thin and large sheet. The capability of expansion of the metal is greater than that possessed by the enamel. Therefore an unhappy result occurs at the cooling. The metal contracts much more than the enamel, and loses its shape, while the latter cracks and scales by yielding to the action of the metal. In order to overcome this great difficulty, the precaution is taken to counter-enamel the piece: that is to say, to enamel it upon the reverse side, and to fire, at the same time, these two enamel coatings whose effects are reciprocally destructive.

At this point, we must occupy ourselves with the most important process—that of firing—which is often the source of disappointment and failure for the most skilful and careful artists.

The methods of firing, or rather the com-
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bustibles employed, are different; although all of them aim at the same result: charcoal, coke, petroleum and gas have all their strong partisans. But while the agents of firing vary, the process of firing itself remains always the same. It may be described as follows:

The furnace of the enameler is made from fireproof clay and provided with a muffle of the same material. For the muffles designed for the firing of large pieces, brick ovens are constructed. The muffles are open or closed according to preference. In the furnaces heated by coal or coke, they are open, and usually intended to form a simple chamber in which the piece to be fired is introduced. On the contrary, in the furnaces heated by petroleum or gas, these chambers are tightly closed, in order to protect the objects against the direct action of the long tongues of flame. Lastly, whatever may be the mode of heating, the furnace is ready for use when the muffle is uniformly red hot.

The piece to be fired is first thoroughly dried by means of a worn cloth having absorbent qualities; then it is placed near the furnace and turned frequently, in order that evaporation may be complete. The piece is mounted upon a very thin cake of fireproof clay. At the proper moment, the clay is seized by pincers and slowly forced into the furnace. It is then that the enameler must follow his work with a watchful eye. The slightest inattention may be productive of fatal consequences, the least of which can easily annihilate the long cherished work. The piece is turned upon its mounting; so that its different parts receive an equal degree of heat. Then, when glazing has occurred, it is withdrawn carefully and cooling ensues gradually.

The firing is usually accomplished at a temperature of eight hundred degrees approximately.

If it be necessary again to apply the enamel and to re-fire, the same operation is repeated the required number of times.
Among the too frequent accidents of firing is the collapse of the metal sheet. It is well to have at hand a plate of sheet iron, having the same form as the piece to be enameled and covered with pulverized red ochre. At its exit from the furnace, the piece, still soft, is applied to it, and by aid of the spatulas a rapid work may be accomplished restorative of the lost firmness. The red ochre prevents the counter-enamel from adhering to the sheet iron.

After the successive applications, the enamel is finally deposited in the desired quantity, or even in excess. It then remains to form and polish the surface. For this process files are used, together with emery-powder growing finer and finer in grain. At last, the piece is again fired, in order to glaze it.

A still more perfect and absolutely mirror-like polish may be obtained by submitting the enamel to a wheel of alder-wood, moistened with water holding very fine pumice-stone in suspension.

The enamel is now finished. It remains only, if the piece be of copper, to gild the visible parts of the metal, if such be the intention of the artist.

Of more frequent use than the champlévè, the cloisonné process possesses advantages over the first named, as well as having certain disadvantages from which the other process is wholly free. The disadvantages can be epitomized as follows: in the champlévè, the reserved line of metal can be rendered expressive; it can vary in thickness, expand, diminish, and receive accents. In the cloisonné method, on the contrary, the metal thread forming the design is incapable of expression. It is true that threads of varying thickness may be employed, but the same line can not, at a desired point, expand into a metallic area. But this disadvantage is compensated by a greater freedom of treatment, and, at the same time, by a greater rapidity of execution.

In this method, the metallic partitions which are found in the body of the champlévè, are here replaced by movable partitions, separately made and soldered upon a background. The remainder of the execution is identical in the two methods.

A strong and clear design is first made. Then, upon this design or upon a very exact tracing of the same, with the aid of fine pincers, thin metallic bands are so turned and curved that they will reproduce perfectly in the enamel every outline of the design. These metallic bands, one millimetre
or less in width, are, according to the case, of brass, silver, or fine gold.

We have thus seen that the lines of the design can be exactly reproduced by means of the metallic bands. It now remains to fix these partitions to the background of the piece. To this end two processes can be used.

Upon the piece the design has been carefully drawn or transferred. Little by little, the partitions are put in place, and there fixed by the agency of silver solder, with the result that the partitions are incorporated with the metal itself. Usually, however, to insure greater rapidity, the piece is lightly enameled with the flux, and upon this stratum of enamel the design is transferred by means of greased paper. A slight firing is then given. The fatty substance is volatilized and the coloring matter remains. Then, the partitions are put in place and fixed by gummed water. Small deposits of enamel are now made at the angles and the intersections of the metallic bands. The piece is then fired and by this means the partitions are firmly established. Finally, as in the champlévé method, the piece is charged with the enameling substance, fired and finished.

But in the champlévé, as in the cloisonné method, there exists an important resource, which the artist uses with great effect, and of which we have not yet spoken. This is the paillon (spangle).

By this name we designate thin leaves or particles of metal, which, placed beneath transparent enamels, impart to them a brilliancy which could not be otherwise obtained. Three metals are thus used: gold, platinum and silver. First, an exact tracing is made of the parts destined to receive the spangles. Then the metal leaf to be cut is placed upon a thin board of fine-grained pear-tree wood, or upon glazed cardboard, when the tracing is applied to it. Now, with a delicate and very sharp knife, the tracing and the metal are cut together according to the pattern; the paper pre
this, the spangle is seized and applied by pincers to the metal, a light pressure being exerted. The gum having dried, firing is sufficient to fix the metal, which is subsequently covered with enamel of the desired color.

Other methods, which we shall not describe, are still in use. But a simple observation of importance may here be made. It must be remembered that a transparent enamel participates of necessity in the tone of the metal lying beneath it.

It remains to describe perforated enamels; that is to say, enamels supported only by their adherence to the metallic cells or partitions, without having a background of metal.

To produce such specimens two processes are employed, which we shall rapidly describe.

Usually the perforations of the object are made in its own substance; that is: the object is formed of a single piece from which the figures to be replaced by enamel have been cut out and removed. Thus, for instance, in a green leaf, surrounded and veined with gold,—the veins ending at the surrounding line,—all the green part is removed, the veins adhering to the line of contour alone remaining. The green part is subsequently replaced by enamel. The metal being thus perforated, the enameling is begun by increasing the thickness of the partitions, and the operation is repeated until the voids are filled. But in large and important pieces in which the voids have an extensive area, a support of pure gold is placed beneath the enamel; a proceeding which is equivalent to the *cloisonné* method. This support of a very thin sheet of gold is finally removed. It is needless to say that the pieces thus inserted may be raised to high relief through the use of an excess of
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enamel. Certain artists even add blowpipe enamel to the paste, in order to obtain a double high relief (cabochoamination) of the two surfaces of the piece. But as colored enamels, used in such great thickness, would often be too dark, the perforations are first filled with the colorless enamel base; the colored enamel being reserved for the later strata. This process belongs more immediately to the champevé method, in which the partitions or cells form an integral part of the piece. Still another process is that of cloisonné pure and simple. According to this method, the form of the object, as for example, a vase, is first built up in copper, and covered with gold leaf, upon which the transferred design is gradually replaced by the metal partitions, turned and curved in the required patterns. Then, the piece is enameled and fired. Finally, the inner copper vase is corroded and destroyed by acids, the gold leaf is torn away, leaving the enamel to unite the partitions, to hold them firmly together, and thus to constitute in itself the very substance of the object. It is evident that this process is delicate and perilous, exposing those who undertake it to disappointment and failure. In this method, transparent or translucent enamels only are employed, and if it become necessary to render the material less brilliant, this result is easily obtained by subjecting it to a mixture of equal parts of acetic acid and of fluoride of sodium.

Perforated cloisonné enamel. Executed by Thesmar

We have now briefly described three technical processes of enameling. Two others remain to be treated in a subsequent article. We have now to mention certain artists who work according to the methods already examined.

M. Tourette, of whose work we give several illustrations, possesses faultless technique, which not only overcomes, but defies all the difficulties of the art. He is an excellent colorist seeking strong effects and
obtaining frequently harmonious contrasts.

M. Feuillatre uses various materials and methods; appearing, however, to favor the enameling of pieces in silver, in producing which he has no rival. He also executes jewels, certain of which are most successful. In the bonbon dish which we have chosen for illustration, he shows a silver armature formed by the bodies of dragon-flies provided with enamel wings. Beneath this decorative enclosure we find a glass vessel of swelling contours.

M. Houillon is an excellent artist who has long since mastered the last secrets of his processes. It is to him that we owe the execution of cloisonné enamels which are absolutely typical. One of his compositions here reproduced, will show the perfect accuracy of his work and render unnecessary any further comment.

M. Heaton is a foreigner whose most important pieces were executed in Switzerland. This artist holds individual views regarding the use and position of enamel among the arts, believing that it should be given a place in architectural decoration, and not restricted to objects of small, even of minute proportions. In proof of his theory he has successfully treated large surfaces, as in the case of the façade of the “Maison Roddy,” in Paris, at the junction of the rue Drouot and the boulevard des Italiens.

In the work of M. Thesmar, however, we approach an exquisitely refined art. He seeks the most brilliant and harmonious effects obtainable from gold cloisonné and transparent enamels. He treats with gold cloisonné vases of Sévres soft paste, one of which is shown in the Museum of the Luxembourg, while four other specimens exist in the Ceramic Museum at Sévres. At the present time, this artist is engaged in experimenting with the same variety of cloisonné upon a
new composition of the governmental manufactory, which is a compromise between hard and soft paste. The results thus far attained in these experiments promise a future production of fine works of art.

The enameled of M. Suau de la Croix are somewhat less studied; this effect being due principally to the light color-schemes which he uses in his works with double high reliefs. It may be also, that he disdains absolute harmony, but his technical ability is of the highest excellence. He is also a tireless, experienced workman whose productions witness hard labor and artistic honesty. Further to his credit, he has been able to train an excellent pupil, Mademoiselle Montigny, who, while using the same technical processes, evidences originality and personal style.

In a subsequent article we shall study the two remaining varieties of enamel known under the names of basse-taille and painted enamel, as also the productions of artists who devote themselves especially to these branches of decoration.

The analogy between the musical scale and the color scale has been many times noted.

Helmholtz draws the following analogy:

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<tr>
<td>g</td>
<td>Ultra-violet</td>
</tr>
<tr>
<td>g sharp</td>
<td>Ultra-violet</td>
</tr>
<tr>
<td>a</td>
<td>Ultra-violet</td>
</tr>
<tr>
<td>a sharp</td>
<td>Ultra-violet</td>
</tr>
<tr>
<td>b</td>
<td>End of the solar spectrum</td>
</tr>
</tbody>
</table>

—From Recollections and Impressions of James A. McNeill Whistler