Pierre-simili and *cimorné* cladding: from modern craftsmanship to contemporary renovation techniques

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Abstract

This paper introduces and valorises *pierre-simili* and *cimorné* cladding by confronting knowledge resulting from literature, patents and lab analysis. This leads to original formulas and application methods, which will be further investigated towards scientific renovation and restoration strategies.

Early 20th century architecture is characterized by the development of innovative finishes like *pierre-simili* and *cimorné* cladding. *Pierre-simili* finish or 'stone imitation' is used in order to imitate sandstone masonry façades. The illusion of stone is obtained by adding lime, mica and crunched stone to a light grey or white cement (bad mortar) and by scraping the surface to create a rough texture. Consequently false joints are drawn into the wet mortar.

Cimorné (*ciment orné*) means 'decorated cement'. Opal glass fragments are projected into wet mortar. This technique allows applying a bright coloured mortar that does not fade.

Currently, there is no scientific based strategy to solve present damage such as contamination, cracks and peeling off. The combination of a literature study, a study of records, patents and onsite research followed by laboratory analysis of onsite lifted samples leads to formulas and application methods that will contribute to future renovation/restoration projects.

Keywords: decorative cladding, finish, stone imitation, restoration/renovation strategy, material-technical research, early 20th century heritage.

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1 Introduction

Early 20th century heritage attracts our attention and becomes subject of many renovation campaigns. These campaigns are often accomplished without a sufficient knowledge of the craftsmanship inherent to this recent heritage. Therefore, incorrect decisions are made during the renovation process, often with an inaccurate treatment as outcome. Consequently, unique masterpieces tend to disappear or become damaged.

Pierre-simili and *cimorné* claddings were developed by craftsmen and are nowadays threatened by damage such as cracks, ruptures, lichen, vegetation, pollution, opaque deposits, lacunas, loosening of the cladding, etc.

This paper treats the *pierre-simili* and *cimorné* finishes, their origin, characteristics, composition and application. Their repair evokes a lot of questions with respect to the composition as well as the application technique. Hence questions arise on how to deal with these early 20th century heritage techniques during restoration and how to restore and/or repair these unique decorative claddings.

Hardly any written or iconographical source exists on these types of decorative plasterwork for outside use. Only some vague building specifications in local publications [1] and a student dissertation [2] are dealing with the *cimorné* technique. On *pierre-simili* plaster in particular only limited information is available. Usually similar techniques like *similimarbre* and *pierre artificielle* are described in historic treatises [3]. A research through historic patents [4] resulted in several useful patents regarding *cimorné* and *pierre-simili* finish, their original formula and application techniques.

A material-technical research of these remarkable finishes is necessary to set up scientifically based renovation and restoration strategies. Several sources such as old plasterer manuals, plans, patents, journals, advertisements, lab analyses and building specifications will be considered and confronted. Onsite lifted samples will be submitted to laboratory investigation in order to analyze the mortar composition. This gained knowledge on the original formula and application will be essential before onsite interventions or repair can occur.

2 Pierre-simili: a peculiar stone imitation

The *pierre-simili* technique or 'stone imitation' [5] is applied in order to imitate a façade in sandstone masonry and to camouflage unattractive grey cement mortars. This imitation technique should not be confused with *pierre artificielle* (artificial stone) or *similimarbre* (artificial marble) which are poured into moulds to create building blocks.

A stonelike illusion is obtained by adding lime, mica and crunched stone to a light grey or white cement (bad mortar) [6]. The surface is scraped to create a more rough texture and veracious aspect. Lines are drawn into the wet mortar and sometimes painted beige, grey or red, simulating the joints.

(a) (b) (c)

Figure 1: (a) Gilissen-Lebon house, 1926, Huib Hoste, Hasselt (Belgium): balcony covered up with *pierre-simili* (photo: A. Verdonck). (b) Sample of pierre-simili, lifted at the balcony of Gilissen-Lebon house. (Photo: dossier PV31084, Reyntjens laboratory, KUL). (c) Layered structure of pierre-simili sample: I. concrete rendering with coarse aggregate, II. preparatory undercoat with quartzsand as aggregate and III. top layer with ground limestone fragments. (File D.2009.10297, KIKIRPA).

2.1 Formula

During the 1920s and 1930s, the Brussels *Etablissements Cantillanna* company produced a French stone imitating plaster. This finish was called '*Supra Enduit Simili-Pierre*': '*Supra, a dry plaster composed of ground stone and binding agent, possesses the hardness of first quality concrete and will not be affected by climatic conditions or atmospheric influences. It is possible to create a variety of textures with an attractive aspect.*' [7]. Of course, these kinds of advertisements do not mention exact formulas. The *Supra* brochure however presents different execution methods and surface textures.

Sources which do reveal authentic formulas for stone imitation products are patents [8]. Patents *BE137905, BE170533* and *BE297606* (dated respectively 1898, 1903 and 1921) claim and describe the preparation of stone imitating products. A summary can be seen in table 1.

According to patent specification *137905* [9] a dry mixture of sandstone, calcium carbonate, calcium phosphate, pumice and talc is added to a liquid that consists of turpentine, linseed oil, white oily varnish, water, siccative and white lead (grind in oil). This mixture is called *'Stucatine'*.

About 5 years later (in 1903) *Mr. Ferber* claims a '*procedure to cover surfaces with a plaster imitating stonework*' [10]. Zinc white and turpentine are used as binding medium for a mixture of ground silicate stone fragments, calcium carbonate and calcium phosphate. Silicon powder forms the base of this

plaster which is applied in 3 layers. Firstly, a rendering consisting of silicon, white lead, benzene, linseed oil and siccative is prepared as rendering. Silicon, calcium phosphate, calcium carbonate, zinc white, essence of turpentine and siccative are the ingredients of the second layer. The third top layer is similar to the second one, but contains more binding agent.

The third patent [11] describes a *pierre-simili* that consists of 50% crushed white lead, 30% white cement [6], 5% lead oxide mixed with essence of turpentine, 12% oily varnish and 3% coloured earth.

The abovementioned patent specifications mainly identify ground stone fragments, bad mortar, pigmented oil paint (pigmented with white zinc or lead white) and siccative (to reduce the drying and hardening process) as ingredients.

Additional or replacing ingredients appear in another patent. '*Cristal simili*' is patented in 1912 and contains gypsum and crushed glass [12]. Mica or quartz can also be added instead of crushed glass to create a sparkling aspect.

Table 1: Content of patents.

	PATENTS	137905 1898	170533 1903	297606 1921	244516 1912	212606 1908
	INGREDIENTS	Collantier G.F.	Ferber R.	Leclercq E.	Braeckman J.	Soille J.-B.
dry mixture	stone fragments	180g sand stone	silicate stone			Euville stone
	binder			30% white cement	gypsum	cement + lime
	calcium carbonate	100g	yes			
	calcium phosphate	200g	yes			
	silicon	60g pumice 20g talc	silicon powder			
liquid	essence of turpentine	85g	yes + benzene	yes	yes	
	oil	55g linseed oil	linseed oil		yes	
	varnish	25g white oily varnish		12% oily varnish		
	water	30g				
	siccative	25g	yes		yes	
	pigment	220g white lead	zinc white, white lead	50% crushed white lead lead oxide 3% coloured earth	zinc white	
	additives				crushed glass	mica / quartz / crystallized lime

A second kind of mixture is described in patent *212606* which points out mica, *Euville* limestone, cement and lime as main ingredients. According to a later 'improvement patent' mica can be replaced by quartz or crystallized lime [13]. This oil-free composition was widely spread and applied according to the investigation of reports on analyzed samples at the *KIKIRPA* laboratory, the *Royal Institute for Cultural Heritage* in Brussels [14]. The main study is illustrated in Table 2. Analyses of monolayer systems approach the description of patent *212606*: a composition of cement, about 50% of ground limestone and some small percentages of quartz were found. Unlike the patent's formula, no bad mortar (cement and lime) but a cement-based mortar was applied. But cautiously handling and interpretation of the terminology is recommended since 'white cement' is not equal to white coloured cement [6].

Analyses of two-layered plasters (as found in the Van Damme house and the Wielemans hotel) reveal the presence of red iron oxides and ochre particles, added as pigments. Also patent *253968* [15] demonstrates the presence of red-yellow spots characterizing the aspect of French sandstone. To imitate this stone

aspect, iron filings are added to gypsum, lime or cement. According to the patent's description, this technique can also be applied for *pierre artificielle.* Consistent with this patent, *pierre artificielle* and *pierre-simili* are composed in the same way but processed differently into either blocks or a spreadable mixture.

The simili plaster of the *Gilissen-Lebon* house (figure 1(a) and (b)) consists of 2 layers applied upon a concrete rendering (figure 1(c)). The rendering is followed by an undercoat with quartz sand as aggregate and a third final top coat, containing crushed limestone [16]. The hydraulicity decreases as the layers are situated more at the surface. Both coatings are based on a cement binder. Instead of medium sand the final coat's aggregate is ground *Savonnières* limestone fragments.

According to this project's building specifications [17] a bad mortar is enriched with crushed limestone like *Savonnières* or *Euville*: *'a mixture of (white) cement and lime, ground stone and grains of quartz. Its colour is mainly determined by the used type of stone or cement.'* The building specifications do not mention a layered structure, the stone's nature or the application method. The greyish undercoat seen in figure 1(c) indicates the use of grey cement in contrast to a white cement mentioned in the building specification. The light coloured top layer confirms this formula. An additional analysis executed by the *Reyntjens* laboratory [18] repeats the buildings specifications and points out a bad mortar composed of white cement and lime.

Following the first group of patents, *pierre-simili* obtained its colour and stony aspect by means of pigmented oil paint and ground stone fragments. In contrary, lab analysis, patent *212606* and building specifications do not mention any use of pigments or oil paint. They present a mixture of ground *Euville* or *Savonnières,* bad mortar and mica. Mica, quartz sand or crushed glass are often submitted to create a shimmering view and enhance the stony aspect.

Further investigation is necessary to figure out if the discrepancy between these two types of mixtures indicates different applications. A more pasty mortar arises as a result of the addition of linseed oil. This pasty mortar could be more easily poured into moulds (like *pierre artificielle*) and used for decorative elements. Or could it be that the paint-like texture of the first main group points out an interior application where the plasters were mainly applied for outside use?

2.2 Application technique

The application of *pierre-simili* occurs in several stages [19]. Mostly it is composed of two layers: a rendering (primer or base layer) and a final coat (top layer).

All impurities and paint residues must be removed in advance. The concrete or brick support is roughened by means of a metal wire brush and thoroughly rinsed to remove all dirt. Wooden building components and lintels are covered with metal reinforcement nets.

This preparation phase is followed by the application of the rendering. In case of a rough surface, this rendering will be applied in two layers. Subsequently,

Table 2: Content of lab analyses of *pierre-simili* samples, executed at KIKIRPA (Royal Institute for Cultural Heritage, Brussels).

object	Gilissen - Lebon house	Janssens-Gilissen factory	Fortisbuilding	Koningin Elisabethlaan house	Van Damme R. house	Wielemans hotel	KBIN	Résidence Palace
city	Hasselt	Hasselt	Brussels	Ghent	Ghent	Brussels	Brussels	Brussels
construction date	1926	1929			1928		1898-1905	1924-1925
architect	Huib Hoste	Arthur Baar			Jules Lippens		Emile Jamlet	Michel Polak
lifted sample	simili plaster	simili plaster	stone imitation plaster	simili plaster	cemented façade		stone imitation plaster	simili-stone
place lifted sample	balcony	lintel ground floor	façade				hall	
FIRST LAYER	**1. concrete rendering**	**1. rendering**			**1. rendering**	**1. rendering**		
type of binder	cement	cement	hydraulic lime or cement	air-hardening lime	cement	Portlandcement, presence of clinker	cement (probably white cement since no trace of iron was found)	binder based on (white?) cement, iron-rich slag is added
Si-content in binder	41.2%, highly hydraulic	35.0%, highly hydraulic	22.5%, hydraulic binder	7.1%, air-hardening	14.4%, light hydraulic	hydraulic binder		
type of aggregate	coarse gravel and medium course sand containing quartz	medium course sand, containing quartz	ground Savonnières limestone	sand containing quartz: ground limestone = 5:1	rugged sand, contains quartz	limestone: ground Euville and Savonnières, only little quartz	maximum 5% of quartz, minimal 50% of Euville, few % of Savonnières	up to 50% ground limestone (probably Ravières), few % rugged quartz grains
binder/aggregate		normal binder content (3:2)	2:3	high binder content (1:1)	high binder content	1:2 - 1:3		
presence of	charcoal fragments		fine charcoal and coal fragments, synthetic fibres	large charcoal fragments and brick fragments	limestone fragments, charcoal fragments, red ironoxide pigments			up to 5% muscovite (mica or glimmers)
remarks					mass coloured		false joints are present	
SECOND LAYER	**2. middle coat**	**2. top layer**			**2. top layer**	**2. top layer**		
type of binder	cement	cement			cement	cement or bad mortar (cement and lime)		
Si-content in binder	35.6%, hyghly hydraulic	27.6%, highly hydraulic			26.8%, moderate hydraulic	hydraulic binder		
type of aggregate	medium coarse sand, contains quartz	ground Savonnières			ground limestone fragments, type of limestone unknown	ground Euville		
binder/aggregate	normal binder content (3:2)							
presence of	charcoal fragments, lime pits				red ironoxide pigments	iron oxides, ocher particles pigments		
remarks					mass coloured			
THIRD LAYER	**3. top layer**							
type of binder	cement							
Si-content in binder	20.5%, hyghly hydraulic							
type of aggregate	course ground limestone fragments							

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grooves and notches are drawn into the mortar with a metal comb, knife, fork or a nailed board to provide better anchorage to the top layer.

The final top coat has a thickness of approximately 5–8mm and is applied onto a pre-moistened surface to prevent it from drying too fast. To ensure a controlled hardening process the cladding is shielded from sunlight and is moistened during the next 2–3 days.

Removing straight lines of the wet top layer creates false joints. Often, these joints are painted or filled with cement. Literature and advertisements don't specify the exact implementation method.

Typically *pierre-simili* is ruffled up to create a rough texture that approaches the aspect of stone. During the drying process, the surface is again scratched with a nailed board. Finally, the cladding is brushed.

In contrast patent *137905* [9] describes the application technique of *Stucatine:* scraping of the surface is necessary to create a more real stone aspect. *Stucatine* can be applied by an ordinary paintbrush. Once sufficient anchorage is assured an elastic roll levels and textures the *Stucatine* finish. After hardening, the plaster is scrubbed with a piece of sandstone. Joints are simulated by removing the lines of the upper layer with turpentine, consequently colouring these artificial joints. This scratching procedure can also be found in patent description *170533*: '*After application and before hardening of the second rendering coat, the surface is scratched with a brush in order to establish a granular texture. The same procedure occurs after application of the third top layer. In addition, after hardening, the top coat is finally scrubbed with a piece of stone*' [20].

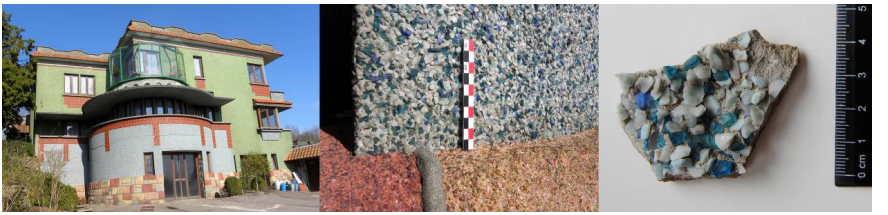
3 Cimorné: an everlasting colour intensity

Mass coloured plasterwork is developed in answer to 20th century architects' desire for large bright coloured surfaces. In order to obtain this intense colour, alkali-resistant pigments like metal oxides are added to cement mortar [21]. Because of fading and washing out, the addition of pigments to cement does not provide a lasting bright coloured façade. Contractor *Pierre Petroons* develops *cimorné* cladding that ensures everlasting colour intensity (Figure 2).

In 1928, Petroons experiments with domestic materials like crushed bottles and waste of the *Marbrite* glass production [22] as a first introduction to the *cimorné* technique, which is launched at the *World's Fair* of 1930 in Liège (Belgium). In 1931 he patents his '*procédé de revêtement de construction'* in Belgium, followed by a French patent in 1932 and two British patents in 1933 and 1936 [23].

Cimorné (or *ciment orné*) literally means 'decorated cement'. Coloured opal glass particles are embedded in a mass coloured cement mortar in order to obtain a shimmering aspect, a certain hue and a unique texture (Figure 2(c)).

Unlike other types of surface finishes, the *cimorné* technique combines an interesting decorative aspect and a large colour variety. It is 20 to 50% cheaper than traditional finishes [24]. The use of raw materials, particularly the re-use of waste from the *Marbrite* production, and a quick execution (in 1 week



(a) (b) (c)

Figure 2: (a) The Pierre Petroons house, 1935, Braine-L'alleud (A. Verdonck). (b) Detail of bluish cimorné cladding (photo: A. Verdonck). (c) Sample of blue shaded cimorné of the Petroons house (L. Dekeyser).

approximately 40m² is carried out by 3 or 4 craftsmen) elucidate the low cost. Moreover, about 30% of *Marbrite* production is regarded as waste and would otherwise end up in the garbage bin [24]. This financial profit fits well into the context of economical crisis of the 1930s, when noble materials were replaced by cheaper equivalents. According to its inventor, the *cimorné* technique requires only little preparation and maintenance: it is '*maintained and cleaned by the washing action of rain*' [23].

3.1 Formula

As shown in figure 3 and table 3, *cimorné* consists of a Portland cement mortar, sprinkled with grinded *Marbrite*. One or two layers of waterproof cement cover up the support. This cement mixture consists of two parts sand to one part of grey cement. The second coat is composed of one part white sand to two parts of white cement and has a thickness of 1/8 inch (about 3.175mm) [25]. Glass fragments will be projected onto this second layer. Its thickness must be uniform so that the glass fragments will equally penetrate all over the surface. Therefore, pebbles may be incorporated into the mortar to serve as spacers [23]. To obtain an ideal and tinted background, this top layer can be pigmented. After smoothening, diverse glass particles are projected onto the surface. The glass granules may not have sharp edges and must be irregular to sufficiently anchor with the mortar.

Petroon's patent explains the grinding process to obtain glass particles of approximately 3-4mm wide. The glass passes through a pair of funnel-shaped and ribbed 'jaws'. A second grinding process occurs between rollers which are also ribbed. Then the glass particles are sieved and classified by size [23]. glass particles of approximately 3, 6 and 9 mm could be obtained [25].

3.2 Application technique

The *cimorné* finish consists of one or two coats of watertight Portland cement. Similar to the *pierre-simili* application, the second layer is roughened with a metal comb to achieve maximal adhesion. A third thin top coat is applied onto the remoistened middle coat.

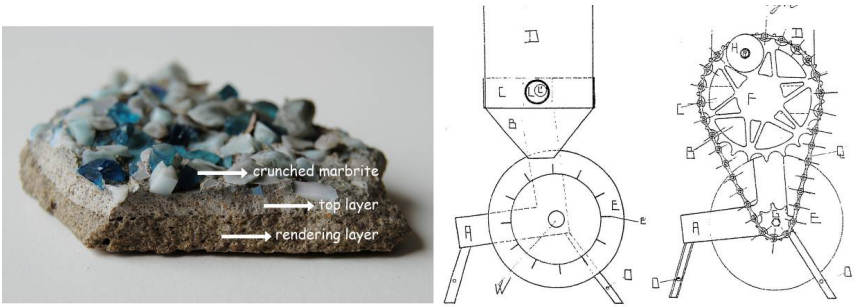
Table 3: Layered structure of *Cimorné.*

LAYER	composition	sand: cement	type of sand	type of cement	type of glass	tinted	thickness
undercoat	waterproof Portland cement	2:1		grey cement		no	
middle coat	waterproof Portland cement	1:2	white sand	white cement		yes	3-4mm
final coat	glass fragments				bottle glass / *Marbrite*	yes	3-4mm

Subsequently craftsmen project glass fragments onto the mass coloured top layer in horizontal strips either manually or mechanically.

According to Walloon building specifications [1], the application occurs manually in a top-down way. A part of the granules attaches to the mortar while the surplus falls down into wooden trays. Immediately after projecting another craftsman pushes the granules into the plaster by means of a trowel or a rubber faced float.

In addition to this labour-intensive application of crushed glass, several patents [23] describe a mechanical projection method. Petroons claims *'a machine for roughcasting building structures'*. As illustrated in figures 3(b) and (c) the glass fragments are collected in a drum (E). One of three available funnels



(a) (b) (c)

Figure 3: (a) The sample clearly shows the different layers. (photo: L. Dekeyser). (b) Drawing of the '*apparatus for roughcasting building structures*'. (c) (*General State Archives*, Brussels, *contemporary archives*: patent 377037, *procédé de revêtement en construction',* Proprietor Petroons Pierre).

(B) under and in the hopper (D) are filled with granules. The size of the funnel depends on the granules size. By operating a handle (H) the drum (E) starts to rotate and the material is thrown from the drum onto the surface. The machine is held at a distance of approximately 10-30cm. Final, the glass pieces are pushed into the mortar by means of a trowel.

4 Conclusion

In order to conserve, restore and renovate *pierre-simili* and *cimorné* claddings an extensive knowledge of the original formulas and application techniques is required. By confronting literature, patents and lab analysis, a first overview of formulas and application techniques is realized. An extended study of patents revealed two global but quite different formulas of *pierre-simili.* Further investigation and confrontation with other sources is necessary to indicate the implementation and relevance of these formulas.

Currently, several *cimorné* samples are submitted for laboratory analysis at the *Royal Institute for Cultural Heritage* in Brussels. For the first time, a *cimorné* sample will be analyzed. Hence, it will be possible to evaluate whether the finish was executed as prescribed in written sources.

Further consulting of additional sources such as plasterer manuals, building specifications and contractor archives is required and will be conducted to value and complete the actual findings.

Original formulas and application techniques will be practiced and tuned for repairing and restoring early 20th century façades covered with *pierre-simili* and *cimorné.* Sufficient knowledge of the original components is essential before any cleaning can occur. Also (local) repair cannot be executed without sufficient knowledge of the historic mortar. This repair mortar must approach the original one's physical qualities, aspect, colour and texture. When totally recovering or renovating a façade, the original formula will be adjusted and improved to avoid the recorded damage. Restoration test-strips are required for each kind of abovementioned intervention and will be set up for different cases. These test-strips, several mixtures based on and derived from the original formula, will be applied onto a support and evaluated in comparison with the authentic cladding.

In the past, craftsmen developed and applied remarkable techniques in order to create a peculiar stone imitation or everlasting colour intensity. Nowadays, renovation campaigns challenge today's craftsmen to approach the authentic view to ensure the survival of these claddings.

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[2] Detry L., *Conservation/restauration des monuments funéraires en cimorné et mosaïverre,* unpublished thesis, Ecole supérieure des Arts, Saint-Luc Liège, 2006, p. 13-15.

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[4] Historic patents are at the *General State Archives,* Brussels, *section 5: contemporary archives.* Registers are consultable at the *Directorate-general of Statistics and Economic information, service for intellectual property* in Brussels.
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[6] Leduc E., *chaux et ciments,* J.B. Baillière & Fils, 1902, p.115 : White cement isn't white coloured cement. 'White cement' is 'heavy white lime mixed with about 10% of natural or artificial bright coloured cement': *'…un ciment special produit dans certaines usines du Midi. Ce ciment est de la chaux lourde blanche à laquelle on ajoute environ 10p.100 d'un ciment naturel ou artificiel de couleur claire…'*
[7] *Archives d'Architecture Moderne,* Brussels, Advertisement *Enduit Simili Pierre Supra*, box *Pierres Artificielles/reconstituées (Matériaux) : 'Supra est un enduit sec dont le mélange de pierres moulues et de liants de toute première possède la dureté du meilleur béton et est inaltérable aux intempéries et aux agents atmosphériques. Il permet d'obtenir les textures les plus diverses du plus bel aspect.'*
[8] Historic Belgian patents from 1880 till 1940 were searched. About 840 patents on 'lime', 'cement', 'plaster', 'mortar', 'artificial stone' and 'wall covering' were found. Stone imitation techniques are claimed in 15 patents, 4 patents mention a formula and application method.
[9] *General State Archives*, Brussels, section *contemporary archives*: patent 137905, *'Genre d'enduit imitant la pierre dit La Stucatine'.* Import patent (France), proprietor G.F. Collantier, dated 14.09.1898.
[10] *General State Archives*, Brussels, section *contemporary archives*: patent 170533, *'Procédé pour recouvrir les surfaces d'une construction d'un enduit imitant la pierre taillée',* proprietor R. Ferber, dated 17.08.1903.
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[14] *KIKIRPA, Royal Institute for Cultural Heritage*, Brussels: 55 reports were consulted. 12 reports handled a stone imitation plaster and were analyzed.
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[18] *Reyntjens* laboratory, Katholieke Universiteit Leuven, Departement Burgerlijke Bouwkunde, Woning Gilissen-Lebon en magazijn Janssens-Gilissen, Hasselt, Analyse Similibepleistering, dossier PV31084.

[19] *Archives d'Architecture Moderne,* Brussels, Advertisement *Enduit Simili Pierre Supra*, box *Pierres Artificielles/reconstituées (Matériaux).*

[20] Patent 170533, author's translation of original French text : '*Près que la deuxième couche est appliquée on la râpe à la brosse, de façon à former le grain avant que la couche ne soit sèche. Le même travail se fait immédiatement après la troisième couche. En outre après que le troisième couche a séché, on ponce énergiquement avec un morceau de grès.'*

[21] Everaert G., course book *Historische uitvoeringstechnieken, deelvak: exterieur*, Master of Conservation of Monuments and Sites, Department of Architectural Sciences, Artesis Hogeschool, Antwerp.

[22] *Marbrite* or *Marmorite* is a brand of opal glass: none translucent mass coloured glass, sometimes marbled. It was developed by glass blower Arthur Brancart. The glass pieces used by Pierre Petroons come from the *marbrite* factory in *Fauquez: S.A. des verreries de Fauquez.*

[23] *General State Archives*, Brussels, section *contemporary archives*: patent 377037 and 383626, *procédé de revêtement en construction',* Proprietor Petroons P., dated 31.03.1931 and 30.11.1931 (also GB481752, *'improvements in or relating to Roughcast Surfaces for Building Purposes'*, Proprietor Petroons P. and Lang R.F., dated 24.09.1936).

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