

# Patents as a source of documentation for studying artistic technology

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**ABSTRACT** The evolution of art technology is known through different types of sources: archaeological sites, scientific analysis of cultural assets, *realia* and, of course, different types of literature. Within the latter, perhaps one of the lesser known are patents. However, they are an important source of documentation on different technological developments, directly related to the materials used in the artistic and cultural environment. Therefore, the information they contain is of great interest to historians, engineers, economists, curators and restorers. The antecedents of modern patents date back to the Middle Ages: during the Renaissance the first laws were passed related to their issue and the rights granted to the inventor. Throughout the 18th and 19th centuries, regulations were established in different countries which were quite similar to those existing today. The granting of patents is directly related to the economic situation of a country, and also to market demand. In this sense, throughout the 19th century and at the beginning of the 20th, many patents were granted connected with the production of artists' materials and equipment used by artists. Nowadays, there are numerous databases that facilitate access to this type of document. The general structure of patents is described together with the information they contain, the Internet access systems and, finally, some illustrative examples are presented of their use for art technological research and their evolution over past centuries.

**RESUMEN** La evolución de la tecnología artística se conoce a través de distintos tipos de fuentes: yacimientos arqueológicos, análisis científico de bienes culturales, *realia* y, por supuesto, diferentes tipos de literatura. Dentro de estas últimas, tal vez una de las menos conocidas sean las patentes. Sin embargo, su consulta permite constatar que constituyen una importante fuente de documentación sobre diferentes avances tecnológicos, directamente relacionados con los materiales utilizados en el ámbito artístico y cultural. Por tanto, la información que contienen es de interés para historiadores, ingenieros, economistas, conservadores y restauradores. Los antecedentes de las patentes actuales surgen en la Edad Media y en el Renacimiento se promulgan las primeras leyes que rigen su concesión y los derechos que otorgan al inventor. A lo largo de los XVIII y XIX se establece en los distintos países una normativa bastante similar a la que existe en la actualidad. La concesión de patentes está directamente relacionada con la situación económica de un país y, también, con la demanda del mercado. En este sentido, a lo largo del s. XIX y principios del XX, se conceden muchas patentes relacionadas con la fabricación de materiales artísticos y utillajes utilizados por los artistas. En la actualidad existen numerosas bases de datos que facilitan el acceso a este tipo de documentos. En este artículo se describe la estructura general de las patentes, la información que contienen, los sistemas de acceso a través de Internet y, por último, se muestran algunos ejemplos ilustrativos de su interés como fuente de investigación sobre la tecnología artística y sus avances en los últimos siglos.

**Keywords / Palabras clave** patents, invention privilege, royal privilege, artistic technology, artists' tools, source research

## Introduction

A relationship can be established between the history of patents and the introduction of new materials and designs in our way of life. The capacity of invention is inherent to human nature and the first inventions date back to pre-historic times. However, only a few people have a sufficiently developed capacity for invention. Furthermore, only if the inventors are entitled to participate in the earnings generated by their invention will they continue working to improve it or to develop other new ones. This relationship was already evident in classical times, but many centuries had to elapse until some type of legislation was established in this respect (May 2002).

The real need to protect these developments arose in the Middle Ages and during the Renaissance the first laws governing the granting of the so-called 'privileges of invention' appeared. But the most important boost came with the disappearance of the absolute monarchies and the rise of the power of liberal governments when, in tandem, patent laws came into being throughout different countries of the world. During the 19th and 20th centuries, a spectacular development of new technologies, designs and materials took place. Patent legislation encouraged the inventive capacity of scientists, engineers, businessmen and all those enterprising inventors able to manifest their ideas as a useful technology or product. There is no doubt that this inventive stimulus had significant repercussions on society. Nowadays, a great many

of the objects that we use in our daily life or work environment are protected by some type of patent of invention, design or utility model.

Naturally, this situation has also affected the field of art and culture and, therefore, can be seen in museum collections and the types of objects they contain (García Fernández-Villa and San Andrés Moya 2005a). Likewise, it has an important relationship with the materials and tools used by artists. The consultation of old patents gives us access to different types of information:

- Knowledge about the preparation of a material or the modifications introduced in it.
- An approximate date for its introduction into the market.
- Dating of an object (if the date of the patent for the materials of which it was made is known).
- Nationality.

In the following sections, this type of information, its structure and forms of access will be described. Examples of old patents and to what extent the information contained in them is of interest can also be seen.

### The importance of patents

Within the scientific world and that of industrial technology, it is well known that patents constitute the greatest source of technical information. Currently, worldwide, more than one million patent applications are made every year. In most cases, the patent application is the first time the information is published and appears in the public domain. This same reasoning can be applied to materials and artists' tools, and to the designs related to the production of everything classified as cultural heritage.

There are three main types of patent:

- Patent of invention: concerning a product or production process.
- Design patent: outlining the forms, patterns and colour of the product.
- Utility model patent: this is concerned with the configuration, structure or constitution of an object of which there is some advantage in its use or production. It is an invention of a lesser status than those of patents of invention.

Many industrial sectors base their competitiveness on the differentiation of their products, based on their form or industrial design. This term refers to the form and the function of a product as a whole. Industrial designs are important in many fields such as industrial products, fashion or craft, domestic use, medical use, ornamental use, clocks and watches, jewellery, and other luxury goods. Inevitably, all objects that can be included in any of these fields may end up being part of museum collections (textile, ethnographic, science and technology, decorative arts, contemporary art, etc.).

Within the legal framework, a patent confers a 'negative' right; it does not give the immediate right to produce the new patented product and to launch it onto the market. Before this is possible, it is necessary to verify that the object of the invention complies with other legal formalities, such as not infringing the rights of other patent owners. In addition to the above-mentioned, it is necessary to add that its production must be economically profitable. In fact, a patent only provides legal rights to prevent others from copying or using the invention therefore its existence is not necessarily related to the production and commercialisation of the invention. This has to be taken into account when using this type of bibliographical source and trying to relate the information it contains with the appearance of new artists' instruments and materials (Brooks and Rose 2006).

On the other hand, many inventions were never patented for a number of reasons: ignorance of the patent system, failures in the application process, or lack of financial resources (the granting and maintaining of a patent right involves expense).<sup>1</sup> These circumstances may explain why certain products have not been patented, in spite of having had great commercial significance.

### Historical background to patents of invention

The term 'patent' comes from the Latin *litterae patentes* ('letters patent' or 'open letter'): royal grants exposed to open view, bearing the royal seal, which were issued by medieval monarchs to grant rights and privileges. European monarchies granted these monopolies on condition that the techniques applied were to be made public.

From mediaeval times to the present, the terminology associated with these documents has undergone certain modifications, although its purpose remains the same. In the 15th century, the term used was 'invention privilege' or 'royal privilege'; this term was assigned to royal decrees granted for the use of an idea or an invention. They were granted in an arbitrary way and consisted of a reward, such as, for example, cash, a government post or a salary to carry on inventing. These privileges were granted in all western European countries (Arias Pérez-Ilzarbe 2007).

The first privilege known dates from 1416 and was granted by the Council of Venice to Franciscus Petri. It was a 50-year monopoly giving him and his heirs exclusive rights to build a device for the fulling of fabrics. Soon after, in the year 1421, the Republic of Florence awarded the architect and engineer Filippo Brunelleschi a privilege, for the period of three years, for the monopoly of a new kind of ship with a crane for transporting marble. The great creative spirit generated during the Renaissance in Italian city-states led to the regular granting of privileges; in order to normalise this situation, the first law for regulating these privileges was published in Venice in 1474.

Privileges were also granted in other European countries. The first grant issued in England dates from 1449. It was issued by Henry VI to the Flemish-born John of Utyman for 'Opaque glass for the windows of Eton College'. He was granted the monopoly of manufacturing windows using this process for a period of 20 years. In Spain, the oldest known 'invention

privilege' is dated 18 August 1522, during the reign of Carlos I, and was granted to Guillén Cabier for a 'Device to allow a ship to sail in a calm sea'. This privilege was awarded during the Spanish Golden Age, a period in which many privileges were granted (García Tapia 1990: 39–40). In France the first privilege was granted in 1551 to Abel Foullon for his creation of 'typographical characters'.

The increase in the granting of privileges gave rise to the need for their regulation. Gradually, in some countries the process became systematised and corresponding laws were passed, the first one being the Venetian law of 1474. In England the Statute of Monopolies was passed on 21 January 1624 and, in France, the *Déclaration du Roi concernant les privilèges en fait de commerce* was decreed on 24 December 1762.

In North America, the first patents of invention were issued by colonial governments in 1641, following English legislation. The first patent law in the USA was approved on 10 April 1790, the first patent being granted to Samuel Hopkins from Philadelphia on 31 July 1790 for an improvement 'in the making of Pot ash and Pearl ash by a new Apparatus and Process' (Fig. 1).

In Spain, during the 19th century, the granting of invention privileges was regulated and the first patent law was also passed. However, these changes were very much influenced by the political events that took place in the country during that century. During the 'Frenchified' government of Bonaparte, and in the middle of the War of Independence caused by the Napoleonic invasion, the first patent law was passed in 1811. However, the return of King Fernando VII to the throne of Spain hindered this attempt to modernise the state. During the period of the liberal government (1820–23) a further impulse was sought, which was once again halted by the return of Fernando VII. Finally the latter gave his approval for a *Real decreto sobre privilegios de industria* that regulated the granting of 'invention and production privileges', which was passed on 27 March 1826. This decree remained in force until 30 July 1878 when the law was changed again; from then on, the term 'patent' has been used instead of 'privilege' (Sáiz González 1999: 81–98; 2002).

## Patents of invention: general considerations

### Modern patents

A patent of invention, or simply a patent, is a registration of the property right of an invention or technological improvement that protects its inventor, guaranteeing the exclusivity of the latter regarding its manufacture, use and sale. It is a legal monopoly of public access, which protects inventions during a limited period (20 years) and within a certain geographical environment. All countries have their own patent office, although there are also international offices such as the European Patent Office (EPO)<sup>2</sup> or the World Intellectual Property Organization (WIPO).<sup>3</sup> Depending on geographical environment affected, there are different types of patents.

- National: individualised patent application in each one of the states in which protection is required.



Figure 1 First American patent No. X000001, granted to Samuel from Philadelphia on 31 July 1790.

- European: the European Patent Convention (EPC) was signed on 5 October 1973 in Munich. It is a multilateral treaty instituting the EPO and providing a single process for granting patents in the member countries, most of which are members of the European Union.
- PCT: the Patent Cooperation Treaty (PCT) provides a unified procedure for filing patent applications to protect inventions internationally. A single filing results in a single search accompanied by a written opinion (and optionally a preliminary examination), after which the examination (if provided by national law) and grant procedures are handled by the relevant national or regional authorities. The PCT does not lead to the grant of an 'international patent', which does not exist. The treaty was signed on 19 June 1970 and entered into force on 21 January 1978, at the same time as the EPC treaty. It was subsequently amended in 1979 and modified in 1984 and 2001.

Quite often, a first national patent can result in what is known as a family of patents, which includes patents that the same applicant can make for the same invention on an international level (European and PCT), as well as in other extra-community countries.

The text of a patent is divided into different sections, each one providing specific information that may be of interest to the researcher:

- Applicant/s: this can be the inventor(s) or the company or institution that has carried out or promoted the invention.
- Inventor/s: person or persons who has or have made the invention.
- Title: usually sufficiently clear and concise, its reading informs directly on the invention.
- Abstract: a brief explanation of what has been patented.
- Detailed description of the invention: this can be considered as being the main part of the patent. It contains the scientific and technical information on the patent and is divided into several sections:

- (a) Purpose of the invention.
- (b) Antecedents of the invention including bibliographical references and other patents which may be related, as well as technical problems solved using the invention.
- (c) Detailed explanation of the invention, i.e. mechanism, function, components, dosage and all types of related questions.
- (d) Description of the content of the drawings or diagrams.
- (e) Detailed exposition of at least one way of applying the invention.
- Claims: from the legal point of view and for the protection of the invention, this is the most important section in the patent. Here, all matters related with the invention that differentiate it from other methods, processes, products, devices, etc., must be detailed.
- Illustrations, either drawings or diagrams (Fig. 2): only included if necessary.

In addition to the above-mentioned, a series of dates and numbers appears on the first page:

- Application presentation date (6 digits yymmdd)
- Application publication date (6 digits yymmdd)
- Application leaflet publication date: coincides with the previous one
- Date of the patent: the date on which the Patent Office acknowledged the patent
- Publication number
- Application number

When a patent application is filed in a certain territory, its nationality is specified by means of the standard two-digit country code, for example: United States (US), United Kingdom (GB), Spain (ES), Italy (IT), Germany (DE), Switzer-

land<sup>4</sup> (CH), Japan (JP), France (FR). This code appears associated with the patent number (Fig. 2). Likewise, European and PCT patents have their corresponding codes, EP and WO respectively.

As part of the content of a patent document, there is a prior art statement which states the degree of novelty of the invention. This report is elaborated starting from its comparative study with other patents (national and foreign) and with 'non-patent literature'. It also includes the classification of the invention in its corresponding technical sector, according to the International Patent Classification (IPC).

Each of the sections indicated is of interest to the researcher. On the one hand, some of the information contained in them (applicant, title, number of patent application) facilitates access to patents (old or modern) registered in the patent offices of different countries. On the other hand, the reading of these sections, especially those corresponding to the detailed description and the claims, provides valuable information on technological and scientific developments and knowledge of different periods in the history of technology. To all the above-mentioned, it is necessary to add the information provided by the patents mentioned in the report, and those mentioned by the examiner in the prior art statement.

However, it has to be pointed out that old patents are usually simpler (Fig. 1). The first patents did not give any information on the way the invention worked; their only function was to grant the applicant the rights of exploitation. Gradually, the technical information contained in the patent began to gain in importance (van Dulken 1999).

**Historical patents**

As has already been pointed out, one of the details that allows us to gain access to a patent of invention is its patent number.

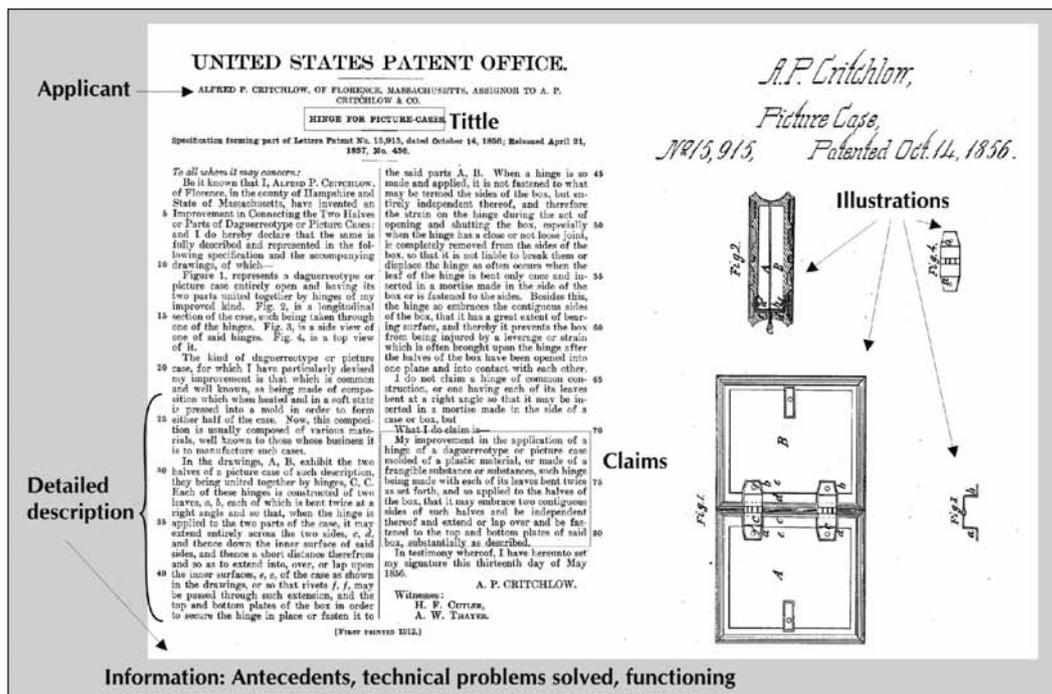


Figure 2 Patent granted in the middle of the 19th century (USPTO No. 15,959).

However, the law applicable for assigning this numeration has varied throughout history and certain variations may also exist depending on the country in which the patent was granted. It should be borne in mind that the legislation regulating granting of patents closely accords with the technological development of the country in question, which, in turn was a decisive factor in the number of patents granted. Also, the title of the first laws that regulated their granting may not have included the term 'patent'; in Spain, for example, the term *privilegios de invención* ('invention privileges') was used.

Apart from questions of a semantic nature, it is very important to take into account all those related to the system of numeration used in different countries. It is also necessary to consider the modifications the system has undergone throughout history; it may even be the case that, during a certain period, the patents of a specific country bear no numeration. This information is of great importance, since one of the methods used for patent searching (both modern and old) is the number.

### *British patents*

British patents registered between 1617 and 1852 originally lacked numeration and were not published. Some entries included the word 'patent' followed by the inventor's or applicant's name. With the updating of patent law in 1852, the 14,359 British patents granted up to that date were then allocated consecutive numbers following the number/year format (e.g.: No. 1/1617; No. 425/1720) up to number 14,359 (No. 14,359/1852). These patents were published during the 1850s. In 1852, a new system was introduced in which the numbering for each year began with the number 1. The patents of that time started to include certain specifications related to the description of the invention. In 1916 a system of continuous numbering was introduced beginning with the number 100,001 and continuing consecutively (100,002, 100,003, etc.) over the following years. In 1979 yet another new sequence was introduced that began with 2,000,001 (van Dulken 1999: 97–110).

### *US patents*

As mentioned above, the first American patent dates from 31 July 1790. Between 1790 and 1836, patents were not numbered, but they did specify the owner and the date. The first numbered patent was granted on 13 July 1836; this numbering begins with number 1 and continues consecutively. Since 1790, the USA has granted more than 6.5 million patents.

### *Spanish patents*

Invention privileges have existed in Spain since the 16th century, but it was not until the 19th century that laws were passed establishing general rules for their granting and the centralisation of their registration. The collection of privileges dates from 27 March 1826 to 30 July 1878. They are administrative files with descriptive reports ordered numerically, beginning with number 1 and concluding with number 5,909. It is necessary to point out that some errors were made in the numbering sequence (for example, it jumped from 3,099 to 4,000); for this reason, the total number of files from that period is 5,015. Starting from 31 July 1878, following the enactment of a new law, the term 'privilege' was changed to

that of 'patent' and the numbering system was modified. With this change, the privilege that would have been number 5,010 became Patent 1. Since 1878 an important increase in the number of patents can be detected: between 1878 and 1920 30,973 patents were granted. Between 1903 and 1923 (during the reign of King Alfonso XIII) 57,873 patents were granted and from 1923 to 1929 (during the dictatorship of Primo de Rivera) the number of patents granted was 24,954.

From the above information it can be seen that if the patent number and the probable date of invention or production are known, the nationality of the patent can be established. For example, a patent number in the region of 100,001 and dated c.1870 would be from the United States; but if it were c.1916, it would be from the UK; c.1873 from France; and c.1898 from Germany.

### *Patent searching and recovery systems*

The patent offices of the different industrialised countries have their own websites allowing modern patents to be consulted. Recently, many of these offices have undertaken a painstaking research task related to the cataloguing and conservation of old patents. In many cases, this work has allowed the creation of a file of historical patents, accessible via the Internet.

One of the most important networks is 'esp@cenet'.<sup>5</sup> It is a service created in 1998 on the initiative of the EPO and in collaboration with the national offices of the states comprising it, which, in turn, are members of the WIPO and the European Commission (DGXIII). This free service enables worldwide searches for inventions and facilitates access to more than 50 million documents. It lists patents from the EPO, WIPO and more than 60 countries. Unfortunately, only some British patents prior to 1920 are available online.

Another way of approaching research on British patents is through the British Library, which stores old patents granted from 1617 onwards.<sup>6</sup> In order to do so, one must provide sufficiently precise data on the theme of investigation. If the search is more complex, a special service is available for researchers.<sup>7</sup> If the number and year of patent are known, photocopies of the patents in question may be obtained through the British Library Document Supply Centre (BLDSC)<sup>8</sup> or the Leeds Patent Information Unit,<sup>9</sup> which allows the recovery of patents from other relevant data, for example, author/year.

American patents are accessible through the United States Patent and Trademark Office (USPTO), whose database allows access to the patents granted from 1790 to the present.<sup>10</sup> The patents that correspond to the period between 1790 and 1975 are only recoverable by patent number and current US classification, and only images of these patents are available. For unnumbered US patents (1790–1836) a search can be run by patent number if an X is put in the number field. Many of these old patents are not yet accessible online. All patents from 1976 onward are available in full text, and there are numerous different search criteria – title, issue date, application date, inventor name, etc.

Spanish patents can be consulted through the Oficina Española de Patentes y Marcas (OEPM),<sup>11</sup> which contains documents from Spain, Europe and Ibero-America in PDF format. Other databases can be accessed from this website.

Access to the invention database in Spanish is via the link 'cibepatnet', which in turn allows access to two databases: 'oepmpat' and 'latipat'. The 'oepmpat' database contains the bibliographical data of patent documents and utility models processed by the statute of industrial property and by the new patent law of 20 March 1986. It also covers European patents requested via PCT which designate Spain as well as generating a document in Spanish. The search fields are: application number, publication number, priority number, dates, applicants and inventor. The 'latipat' database contains the bibliographical data of patents and models from 18 Ibero-American countries. The search fields are: title and abstract, international classification of patents, applicant and inventor, priority number, application number and publication number, and dates.

The OEPM has a significant number of historical patents that remained unpublished until 1990. At the beginning of that decade, important research work was carried out as a result of the collaboration between Universidad Autónoma de Madrid (UAM) and the OEPM. This work has led to the creation of a database on introduction and invention privileges comprising 5,015 entries from 27 March 1826 to 31 July 1878. This database is part of another more extensive one, that of the Archivo Histórico<sup>12</sup> which, in turn, comprises three sub-databases: privileges (1826–1878), patents (1878–1929), and patents (1930–1966). In any of these sub-databases, the search can be carried out by different fields: file number, any word contained in the privilege or patent title, application date, any word contained in the title of the grant or in the applicant's name, as well as the index of contents established by the IPC.

Out of the total number of entries included in the privilege database, a significant number refer to the manufacture or the use of: colourings, pigments, paints, polishes, natural resins, adhesives, varnishes and inks, together with compositions of coatings or methods for treating various materials. In accordance with the classification established by the IPC, these privileges are included within Group C09. Other privilege groups of interest are D06P (textile printing or dyeing methods), B44 (decorative arts), B68 (manufacture of leather articles and upholstery), C14 (tanning) and D (textiles and paper) (Hidalgo Brinquis and Sáiz González 1996; Sáiz and Hidalgo Brinquis 1996).

In all these privileges and patents, the composition of the products, or the method followed for treating the materials, is usually described in detail in the technical specifications that the inventor supplied when applying for the patent. Furthermore, in many cases, they were accompanied by drawings or diagrams and a corresponding explanation. The patents and privileges making up the database of the OEPM Archivo Histórico may be consulted.<sup>13</sup>

Apart from the information contained on the patent office websites of different countries, there are other databases of interest to researchers. One of the most important is the Derwent Innovations Index, which is accessed through the Web of Knowledge (WOK), a site accessible to all public research bodies.<sup>14</sup> It is the best commercial patent database containing the titles and abstracts of patents from 1980 to the present. Other sources of information on patents are WIPO<sup>15</sup> and EPO.<sup>16</sup>

## Importance of patents in the study of cultural heritage

It is well known that technological knowledge has always existed prior to scientific knowledge and clear proof of this can be found in the old patents. In many of them, new inventions are proposed related to the synthesis of new products, or the improvement of other previous ones, the scientific basis of which was unknown at the time. Likewise, new additives are incorporated into the preparation of certain interesting substances, but without knowing their function and the reason for the improvement of their properties. An example is polymeric materials. Surprisingly, many patents related to their processing and technological use date to before their chemical structure and its corresponding relationship with their physical and chemical properties were known (only in relatively recent times). During the second half of the 19th century, important advances were made in developing the first moulding plastics of a semi-synthetic origin, mainly derived from cellulose nitrate and cellulose acetate, rubber and protein substances such as casein and blood (García Fernández-Villa and San Andrés Moya 2002). Table 1 lists the main patents of that time in relation to obtaining materials, and improvement in properties and processing (García Fernández-Villa and San Andrés Moya 2005a,b).

The reading of these patents provides information on the scientific knowledge of the inventors. For example, the British engineer Alexander Parkes, one of the pioneers in the semi-synthetic plastic industry, between 1856 and 1868 patented numerous processes related to the obtaining and improvement of the properties of collodion, pyroxyline and Parkesine (Table 1). His deductive capacity led him to introduce certain additives that improved the plastic properties of Parkesine and which facilitated its moulding. In the description of the invention, Parkes specifies the use of camphor (Parkes 1865); however, he was not aware of the important function carried out by this component and failed to state it in the patent claims. On the other hand, John Wesley Hyatt realised the importance of this additive and therefore included it in the claims of one of his patents (Hyatt and Hyatt 1870).

In the 20th century, the obtaining of synthetic polymers marked the beginning of the plastics era. Research was carried out in large chemical companies, and it is these companies which applied for and registered patent rights (ICI, Du Pont, Rohm and Haas etc.).

With regard to painting materials, for example pigments, it is well known that the synthesis processes of many of them were already known in antiquity, and throughout the centuries many techniques for their purification and preparation have been developed for their use by painters and others. However, the first patent related to the manufacture of pigments dates from the year 1781. It is British patent No. 1281 referring to 'A method of producing a yellow colour for painting in oil or water, making white lead, and of separating the mineral alkali from common salt, all to be performed in one single process which would be of great public utility' (Turner 1781). The description of the invention is as follows:

Take any quantity of lead and calcine it, or minium, or red lead, or litharge, lead, ash, or any calx, or preparation of lead fit for the purpose. To any given quantity of

**Table 1** Old patents related to obtaining and processing semi-synthetic plastics.

Material	Patent title	Inventor	Date	Patent number
Vulcanised rubber	Preparing caoutchouc in combination with other substances	T. Hancock	13 October 1843	BP9.952
	Preserving wood and other substances	A. Parkes	27 December 1843	BP9.807
	Improvement in the mode of preparing caoutchouc with sulphur for the manufacture of various articles	C. Goodyear (assign. N. Hayward)	24 February 1844	USP1.090
	Improvement in India-rubber fabrics	C. Goodyear	15 June 1844	USP3.633
	Improvement in the manufacture of India rubber	N. Goodyear	6 May 1851	USP8.075
Cellulose nitrate	Improvements in the use of collodion in photography	A. Parkes	13 May 1856	BP1.123
	An improvement in preparing materials for, and in water waterproofing and coating woven and other fabrics, paper, leather and other substances	A. Parkes	13 May 1856	BP1.125
	Improvements in manufacturing compounds of gun cotton and other vegetable substances similarly prepared, also in the preparation of castor and cotton oils and gum balata to be used with or separate from such compounds	A. Parkes	28 October 1864	BP2.675
	Improvements in the manufacture of Parkesine or compounds of pyroxiline, and also solutions of pyroxyline, known as collodion	A. Parkes	11 May 1865	BP1.313
	Improvements in preparing compounds of xyloidine or gun cotton, and in the apparatus employed	A. Parkes	8 December 1865	BP3.163
	Improvements in the manufacture of Parkesine or compounds of pyroxilin and in the production of imitation of ivory and pearls	A. Parkes	19 October 1866	BP2.709
	Improvements in the manufacture of Parkesine or compounds of pyroxilin to render such materials more suitable for making billiard balls, and for other purposes	A. Parkes	16 May 1868	BP1.614
	Improvement in compositions for billiard balls and other articles	J.W. Hyatt	14 April 1868	USP76.765
	Improved molding composition to imitate ivory and other substances	J.W. Hyatt	6 April 1869	USP88.633
	Improvement method of making solid collodion	J.W. Hyatt and I.S. Hyatt	15 June 1869	USP91.341
	Improvement in treating and molding pyroxiline	J.W. Hyatt and I.S. Hyatt	12 July 1870	USP105.338
	Appareil pour la fabrication de la soie artificielle pour la filature des liquides	H. Chardonnet	4 March 1890	Swiss Confederation Patent 1.958
Cellulose acetate	Manufacture of cellulose acetate	C. Cross and E. Bevan	17 May 1894	BP9.676
	Process for the production of non-inflammable celluloid	A. Eichengrun	20 June 1922 (first patent application in Germany, 29 November 1909)	USP1.420.028
Protein derivatives	A new or improved product derived from casein or other albuminous substances, and processes for producing the same	G. Krische and A. Spitteler	11 December 1897	BP24.742

the above-mentioned materials add half of the weight of sea salt with a sufficient quantity of water to dissolve it, or rock salt, or sal gem, or fossil salt, or any marine salt or salt water proper for the purpose; mix them together by trituration 'till the lead becomes impalpable or sufficiently comminuted. When the materials have been ground, let them stand for twenty four hours, in which time the lead will be changed to a good white, and the

salt decomposed; ... The yellow colour is produced by calcining the lead after the alkali has been separated from it, till it shall acquire the colour wanted.

The reading of the process leads us to the conclusion that the yellow-coloured pigment to which Turner refers and which has traditionally been known as Turner's yellow, or Patent yellow, is, chemically speaking, a lead oxychloride.

Other terms used for naming it include Cassel yellow, English yellow, *jaune minérale*, Montpellier yellow and Verona yellow (Eastaugh *et al.* 2004: 224).

Certain pigments whose production processes were already known in antiquity have also been the object of patents. Such is the case of white lead. In the 'esp@cenet' database there are 173 entries of patents in whose titles the term 'lead white' appears. Many of these patents refer to its manufacturing process, and others to the equipment used to obtain it. The oldest one granted is dated 23 December 1893; it is British patent No. 22,294 (GB189322294) called 'Improvements in the manufacture of white lead'. In the OEPM there are 11 invention privileges related to the synthesis of *albayalde*, the term traditionally used in Spain for white lead. The oldest is privilege No. 140 dated 18 March 1839 and titled '*Nuevo método para fabricar albayalde*'. Among the patents granted during the period 1878–1929 are 52 in whose titles the term *albayalde* appears and 8 in which the term used for the pigment is *blanco de plomo* (white lead).

Another example is ultramarine blue of synthetic origin. This pigment was synthesised by the Frenchman Jean Baptiste Guimet in 1828, who founded the first factory in 1831. However, the first patents related to its manufacture and the modifications and improvements introduced in its production only appear some years later. For example, the first Spanish patent was applied for on 17 November 1890; it is patent No. 11467 '*Un procedimiento para la composición del azul ultramarino*' ('A procedure for the composition of ultramarine

blue'). In the 'esp@cenet' database, the oldest patent found is British patent No. 3174, 'An improvement in the manufacture of ultramarine' dated 10 December 1903 (GB190303174). Likewise, in the USPTO database, the oldest patent related to this pigment is No. 1,400,431 (13 December 1921) entitled 'Process for the manufacture of ultramarine'.

As for the various types of equipment used by artists, during the 19th century important advances took place in the design and production of new inventions that facilitated their work. Such is the case of brushes, paint tubes, canvas, millboards, academic boards, paint boxes, etc. (Katlan 1999). This production of new materials appears in the catalogues<sup>17</sup> of manufacturers and merchants of the time such as Winsor & Newton, S. & H. Goldberg & Co., F.W. Devoe & Co., Reeves & Son, C. Roberson & Co. and G. Rowney & Co (Carlyle 2001). Many of these products were patented, e.g. the canvas stretcher, collapsible tubes and painters' panels. In some cases the patent applicants were the inventors themselves, while in others it is the manufacturer who is listed as the applicant.

Within this range of advances patented during the 19th century, the collapsible tube deserves special attention. In the first half of that century, the first attempts were made to replace the traditional bladder by paint syringes. The paint syringe was developed by J. Harris in 1822 for the purpose of preserving oil paint (Harley 1971), although no patents granted to Harris for this invention have yet been found. These syringes were expensive and therefore failed to replace the bladder completely. For a short period of time glass syringes were available, which were

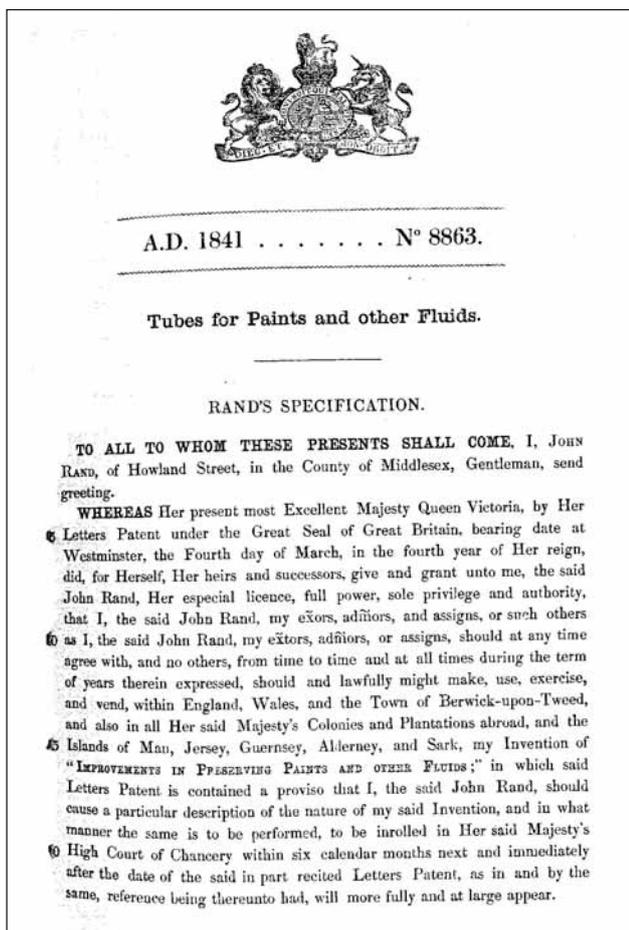


Figure 3 British Patent No. 8863 filed by J.G. Rand.

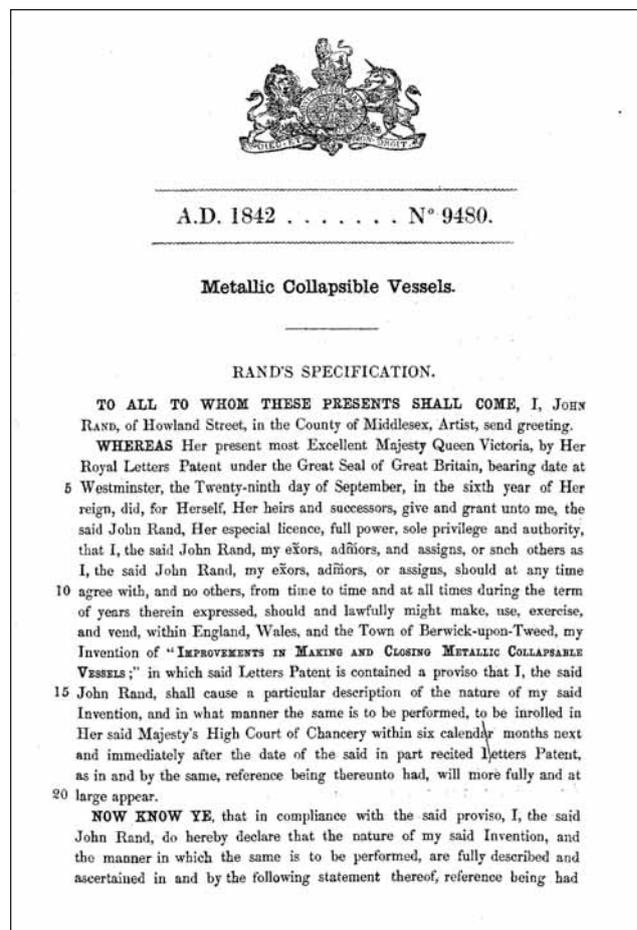


Figure 4 British Patent No. 9480 filed by J.G. Rand.

patented in 1840 by William Newton<sup>18</sup> (British Patent No. 8394) with the title 'Preserving and using colours'. In spite of attempts by Winsor & Newton to promote the use of this system, they did not succeed in replacing the bladder either.

The person responsible for the appearance of collapsible tubes was J.G. Rand, a painter who had an innate inventive capacity. His invention was an important milestone, not only in art technology but also in other areas of the industry aimed at the production of domestic everyday and consumer goods, for example, cosmetic products, pharmaceutical products, adhesives, food, etc.

At the beginning of his artistic career, Rand's intention was to develop a system to replace the traditional bladder and the paint syringes. He succeeded and was issued two patents by the British Patent Office. The first was for 'Improvements in

preserving paints and other fluids' (6 March 1841, Patent No. 8863) and the second was for 'Improvements in making and closing metallic collapsible vessels' (29 September 1842, Patent No. 9480). Rand also achieved the American patents USPTO 2,252 (11 September 1841) 'Improvement in the construction of vessels of apparatus for preserving paint' and USPTO 3,694 (7 August 1844) 'Improvement in the method of making vessels of soft metal'. Rand's collapsible tube patent was commercialised by Winsor & Newton from 1842 onwards and appears in the catalogues of the period (Figs 3 and 4).

Table 2 lists the Winsor & Newton patents that appear in the 'sp@cenet' database and which were registered from the end of the 19th until the middle of the 20th century. The oldest patent is GB189707402 'Improvements relating to collapsible tubes for containing liquid or semi-liquid materials'

**Table 2** Winsor & Newton patents in the 'sp@cenet' database registered from the end of the 19th to the middle of the 20th century.

Register number	Patent title	Inventor	Applicant	Date	Patent number
1	Improvements relating to artists' easels	K. Steel and L.A. Lockwood	Winsor and Newton Ltd	7 May 1958	GB794523
2	Improvements in stands for drawing boards	W.D.W. Sinclair	Winsor and Newton Ltd	1 January 1941	GB532762
3	An improved stand or support for drawing boards or other bodies	R. Henderson	Winsor and Newton Ltd	5 September 1938	GB491544
4	Improvements in and relating to drawing boards and stands therefor	R. Henderson	Winsor and Newton Ltd	26 August 1937	GB471041
5	Improvements in and relating to boxes for artists' colours	W.L. Killik	Winsor and Newton Ltd	4 October 1937	GB472947
6	Improvements in or relating to devices for displaying coloured surfaces to produce colour-mixing effects	J.S. Taylor	Winsor and Newton Ltd	29 September 1937	GB472720
7	Improvements in and relating to artists' easels	A. Newton	Winsor and Newton Ltd	13 January 1937	GB459676
8	Improvements in and relating to artists' colour boxes	W.L. Killik	Winsor and Newton Ltd	30 January 1936	GB441947
9	Improvements in and relating to machines for coating articles by dipping	W.D.W. Sinclair	Winsor and Newton Ltd	6 November 1934	GB419074
10	Improvements in and relating to frames or stretchers for canvas or other material for artists' use	G.W. West W.L. Killik	Winsor and Newton Ltd	1 October 1931	GB357653
11	<i>Perfectionnements à la preparation des fonds, ou surfaces à peindre, pour les artistes peintres et les décorateurs</i>	C.F. Cross	Viscose Dev. Company Ltd; Winsor & Newton Ltd	1 July 1928	FR640064
12	<i>Ein für die Verwendung als Maluntergrund für Künstler, Dekoratiüre oder Handwerker geeignetes, ganz aus Cellulose bestehendes Gewebe</i>	C.F. Cross	Viscose Dev. Company Ltd; Winsor & Newton Ltd	26 June 1930	DE500971
13	Improvements in the preparation of painting grounds for artists, decorators and craftsmen	C.F. Cross	Viscose Dev Company Ltd; Winsor & Newton Ltd	1 January 1928	GB284363
14	Improvements in the Decoration of Fabrics	H. Emens	Winsor & Newton Ltd	13 August 1914	GB191321160
15	Improvements in Devices for Hermetically Closing Jars and other Vessels	J.S. Taylor	Winsor & Newton Ltd	5 February 1913	GB191214903
16	A New or Improved Advertising, Display, or Show-car Device	J.S. Taylor	Winsor & Newton Ltd	2 February 1907	GB190611921
17	Improvements in or relating to Collapsible Tubes for containing Paints or other Liquid or Semi-liquid Materials	J.S. Taylor	Winsor & Newton Ltd	1 February 1906	GB190510522
18	Improvements relating to Collapsible Tubes for Containing Liquid or Semi-liquid Materials	J.S. Taylor	Winsor & Newton Ltd	5 February 1898	GB1897077402

(5 February 1898, Patent No. 7402). As can be inferred from the title, it refers to improvements to collapsible tubes but it cannot be confirmed that this is the oldest patent granted to the company as only some British patents prior to 1929 are available on online.

One's attention is drawn to the fact that they all refer to improvements incorporated into the design of certain tools used by the painters of the time or systems that facilitated the handling of painting materials. It is necessary to point out that none of these patents refer to processes related to obtaining or preparing the pictorial materials manufactured by the company itself.

## Conclusion

The investigation of patents complements information provided by other bibliographic sources. This type of literature gives us information on the manufacturing processes of all types of materials that are part of our cultural heritage, as well as of those instruments related to the work of artists and artisans.

In order to recover the information within the different databases containing old patents, it is important for the search to be carried out properly. It is necessary to start with certain previously known facts such as the patent number, the inventor or applicant's name, the title of the patent and key words in the title or abstract.

The antecedents of modern patents are the so-called invention privileges that were first granted in Europe during the 15th century. They continued to be granted until the disappearance of the absolute monarchies and the establishment of liberal governments. This fact has affected the legislation applied to the numeration of these old patents, as well as their cataloguing in the corresponding databases. These circumstances have to be taken into account by the researcher if a correct search of this type of document is to be performed.

## Notes

1. Between 1852 and 1883 the cost for obtaining a British patent was £25 and the renewal fees could be as much as £150, a fortune for that period (van Dulken 1999: 24).
2. [www.epo.org/](http://www.epo.org/).
3. [www.wipo.int/portal/index.html.en](http://www.wipo.int/portal/index.html.en).
4. In old patents, CH refers to Confederation Suisse.
5. <http://ep.espacenet.com>.
6. [www.bl.uk/collections/patents.html](http://www.bl.uk/collections/patents.html).
7. [research@bl.uk](mailto:research@bl.uk).
8. [www.bl.uk/services/documents/dsc.html](http://www.bl.uk/services/documents/dsc.html); [dsc-customer-services@bl.uk](mailto:dsc-customer-services@bl.uk).
9. [www.leeds.ac.uk/library](http://www.leeds.ac.uk/library); [libdocs@leeds.ac.uk](mailto:libdocs@leeds.ac.uk).
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11. [www.oepm.es](http://www.oepm.es).
12. <http://historico.oepm.es/archivohistorico/>.
13. Enquiries may be sent to: [historico@oepm.es](mailto:historico@oepm.es).
14. [www.accesowok.fecyt.es](http://www.accesowok.fecyt.es).
15. [www.wipo.int/patentscope/es/](http://www.wipo.int/patentscope/es/).
16. [www.epo.org/index.en.php](http://www.epo.org/index.en.php).
17. See [www.npg.org.uk/live/artistsupp4.asp](http://www.npg.org.uk/live/artistsupp4.asp).
18. In 1832 William Winsor and Henry Newton founded Winsor & Newton.

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