Big Garden

The conservation and restoration of large format paintings at the Bilbao Fine Arts Museum. Rafael Balerdi

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1. Rafael Balerdi (San Sebastian, 1934-Alicante, 1992)
Big Garden, 1966-1974
Oil on canvas, 240 x 571 cm
Bilbao Fine Arts Museum
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This article describes the conservation and restoration process of *Big Garden* [fig. 1]. The artist, Rafael Balerdi, is a crucial figure in Basque art of the second half of the 20th century.

The project began with an exhaustive documentary and physical analysis, needed to evaluate the condition of the work and help in the formulation of a proposal for treatment. The proposal was to centre on the new canvas mounting system, conceived as the backbone of a process guaranteeing conservation in the future. Prior to this, a specific new procedure for *Big Garden* was designed, which combined the use of the low-pressure mini-table and the steam pencil to correct simultaneously deformations in the support and painting material adherence problems.

About the work and the artist

Although only acquired by the Bilbao Fine Arts Museum in 1982, *Big Garden* had actually been part of the collection as a deposit since 1979, after being included in the retrospective exhibitions held in Bilbao in 1974 (Bilbao Fine Arts Museum) and Madrid (Ministry of Education & Science, General Direction for the Fine Arts & Archives, National Library). In 1976 it was also displayed in an exhibition shared with Eduardo Chillida in the Kayua gallery, Zarautz (Gipuzkoa).

Balerdi began the painting, one of the largest he ever produced, in 1966 in Madrid: "[...] he worked on it in cramped conditions, with the canvas spread over the four walls of a room"[1]. In the same year, he helped to form the GAUR group with Amable Arias, Néstor Basterretxea, Eduardo Chillida, Remigio Mendiburu, Jorge Oteiza, José Antonio Sistiaga and José Luis Zumeta in San Sebastián, where he eventually settled in 1973.

1 Viar 1993, p. 547.

2. Balerdi at work on *Big Garden* in Andoain school, 1973

A crucial painting in Balerdi's development, *Big Garden* marked the end of the artist's Madrid period. This vibrant painting is a highly elaborate piece in which colour dominates, spreading over the surface of the canvas to create a rhythmic, materially textured composition. Moving in from the edges of the canvas into the centre, Balerdi worked intensively in the eight years he took to complete it.

In the ten years after finishing *Big Garden*, Balerdi did no more oil paintings, preferring to concentrate on chalk and wax crayons on paper. In 1985 he went back to oil on canvas to execute the murals: *Spring, Summer* and *Autumn*.

In the 1960s he was closely involved in education, working intensively with children at public schools in Herrera, Lasarte-Oria and Andoain (Gipuzkoa). While in Andoain sufficient space became available for him to install *Big Garden*, giving him the opportunity to continue working on the painting in 1973-1974 and combine this with his art lessons with pupils at the school. Balerdi decided the work was finished in 1974.

After arrival at the Bilbao Fine Arts Museum in 1979, *Big Garden* was displayed permanently in the modern building. We know some movements were made in this gallery but the painting was at no time taken into the storage area until it was transferred in May 1999 to the original building for storage during the extensive reform of the museum premises, where it remained until 2001.

A brief review of the years the artwork took to complete (1966-1974) and the period it was on display provided us with some valuable information that helped to explain most of the conservation problems affecting what is today the largest stretcher-mounted painting in the Bilbao Fine Arts Museum collection.

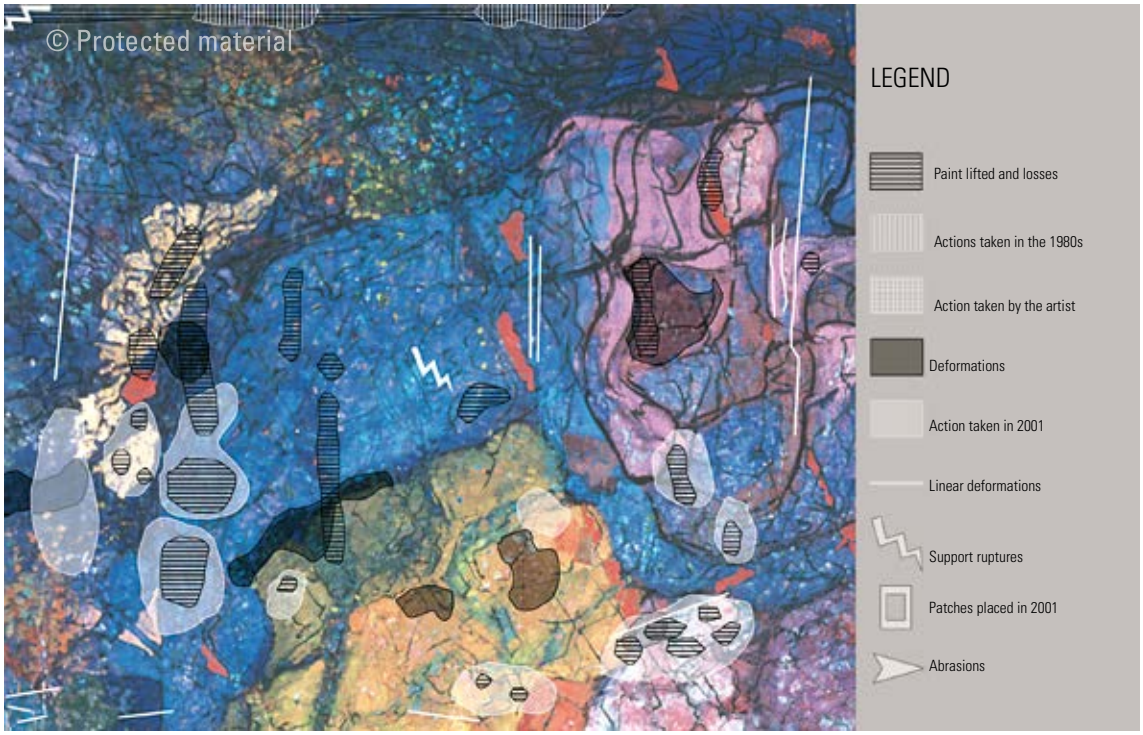
Preliminary study

The conservation and restoration project for *Big Garden* began to take shape in 2001, coinciding with work done in the previous months on the actual installation to mark the re-inauguration of the museum in 2001, after a major refit and enlargement.

Determining the current state of conservation, prior to drawing up a proposal for treatment, involved the documentation and physical study of the materials used in the painting of *Big Garden.* In view of the exceptional size of the work, and the fact that it is an abstract painting, we decided to divide the surface virtually in eight equal sectors as an aid to systematizing all the information obtained.

The preliminary study preceding treatment began with a visual inspection and a photographic record of the front and back with incident, transmitted and raking light. Pathology maps were made for each of the eight sectors, showing the nature of the damage via a specific grid system interpreted in the legend [fig. 3]. The entire surface was studied, with deterioration in support and painting materials being recorded in detail.

The mapping system was crucial to the whole process as it contained all the information on the state of conservation and helped us to draw up an efficient treatment proposal.



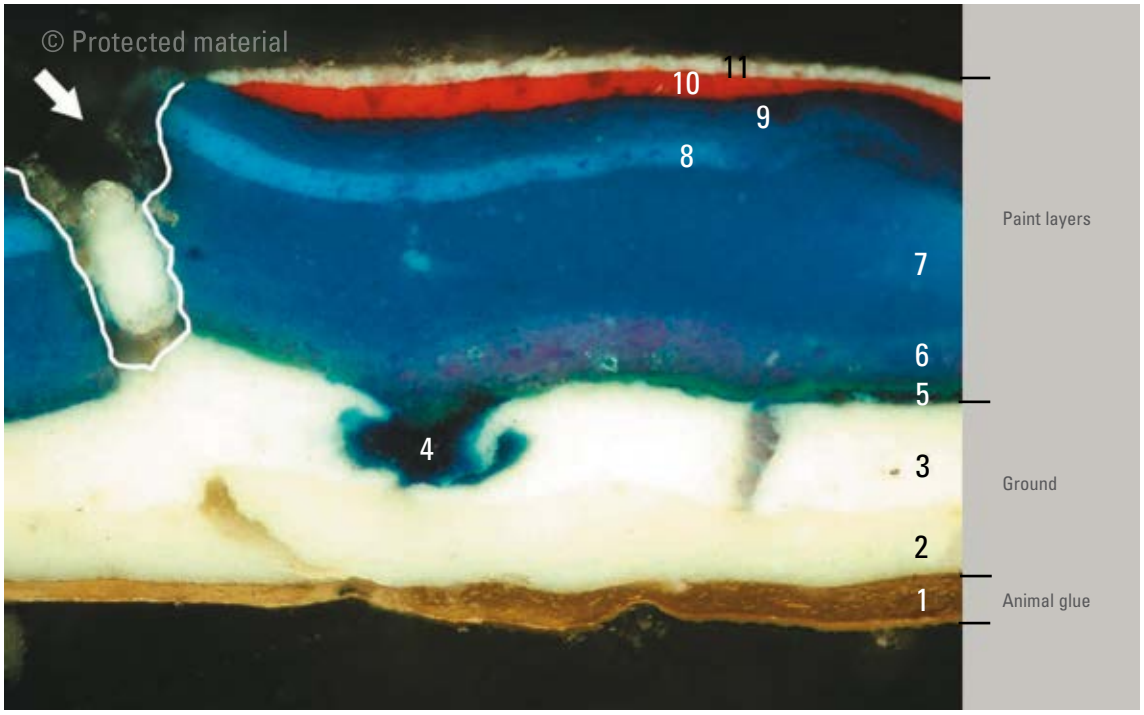
3. Pathology map sector 1.

Identifying materials

Microscope studies[2] of several paint samples and textile fibres from the canvas, and the chemistry analyses performed to identify the nature of the materials, enabled us to form an accurate picture of the medium the artist used and, in particular, to describe a catalogue of interactions between the materials and their connection to the pathologies recorded.

The results from four samples-three paint samples and one canvas support fibre sample-are given below.

The support fibres are linen and fabric-binding density is: 13 x 9 thread/cm^2.



4. Light microscope image of microsample no. 1 (MPlan 10 X / 0.25 lens). Transversal section. The white profile and arrow pinpoint a fissure in the paint layer that was restored using adhesive and stucco

A layer of animal-based glue [fig. 4.1] covers the canvas. Judging by the excessive thickness, the layer, measuring between 25 and 35 µm, may have been applied to strengthen the support and increase adhesion between paint layers and canvas.

A white ground, applied in two layers, is appreciable on the adhesive layer. The inner ground layer is zinc white, barium white and calcium carbonate [fig. 4.2] and the outer layer is titanium white [fig. 4.3]. These layers are highly integrated and appear in two of the microsamples analyzed where all superimposed layers are to be found.

The paint layers, bound with linseed oil, were then applied; microsamples show that brushwork of different tones was closely superimposed. The innermost coloured layer, green in colour, is very fine [fig. 4.5), and is

2 Different techniques are used to perform different types of studies: light microscope for sample studies with incident and transmitted light. Fibre morphological studies in longitudinal and transversal sections and reactions to Schweitzer's reagent. Selective staining and micro-chemical tests. Micron lens for layer thickness measurements with 10X/0.25 lens in the widest area of the stratum. Gas chromatography-mass spectrometry (GC-MS). Fourier transformed infrared spectrometry (FTIR). Scanning electron microscopy–energy-dispersive X-ray micro-analysis (SEM-EDX).

followed by numerous layers in tones of blue and violet [figs. 4.6, 4.7, 4.8, 4.9]. In these layers—common to all microsamples—four different pigments of blue were used: manganese blue, sky blue, ultramarine blue and an unidentified blue colouring, which the artist uses in combination with cobalt violet and titanium white.

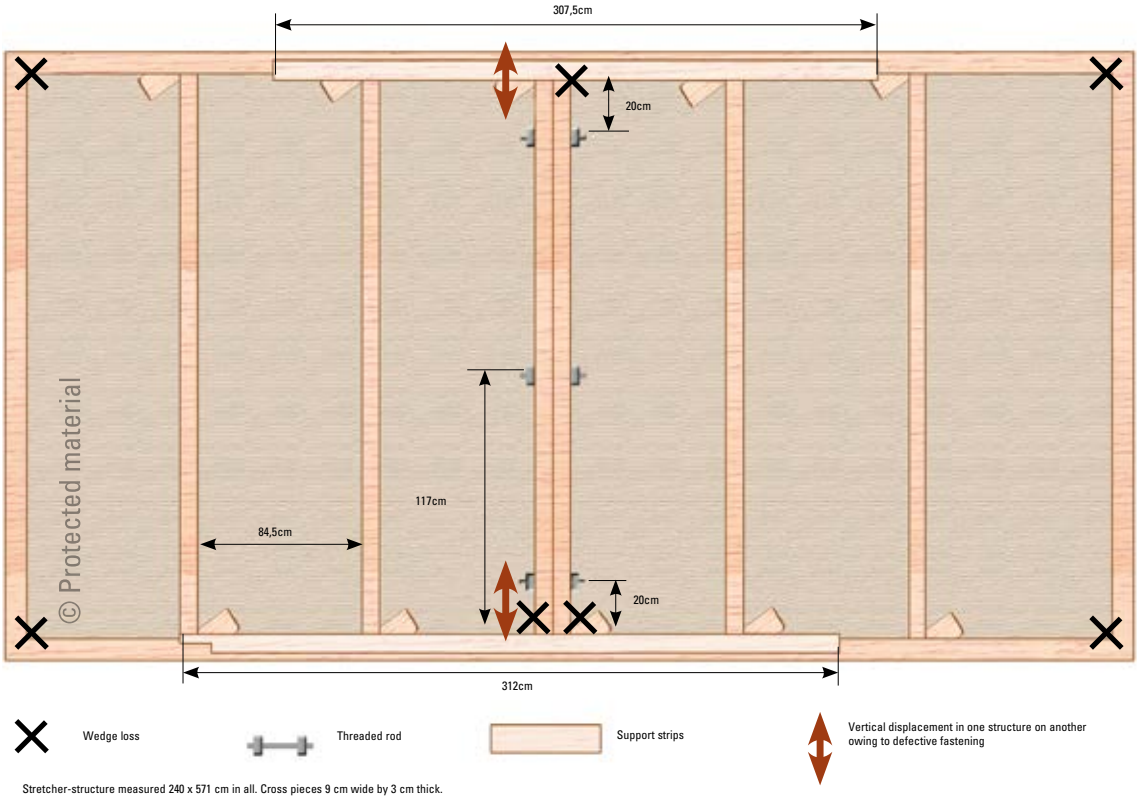
Other white materials regularly identified in association with the coloured pigments are apparently additives added during manufacture of the painting products. These were barium white, zinc white, alumina, gesso, calcium carbonate and talc.

State of conservation

Whenever *Big Garden* was moved during the period from 1966 to 1979, the canvas would have been rolled up, which inevitably damages both canvas and paint. In some cases the canvas was rolled while the paint was still fresh, as the detailed study of the reverse of the work revealed remains of colour adhering that coincided with the rolled surface.

A painstaking analysis of the stretcher [fig. 5] on which the canvas is tensed enabled us to verify its deficiencies. We were even able to attribute the precarious state of conservation of the work to the characteristics of the stretcher.

When the painting entered the museum collection in 1979, for display purposes it was mounted on a wooden structure involving two stretchers joined together by three rods screwed in the central crosspiece. Wooden strips nailed in place by metal points reinforced the upper and lower crosspieces of the structure.



5. Schema of the old stretcher for *Big Garden*

This left a stretcher with five vertical crosspieces, with the double central crosspiece providing the point of union between the two previous stretchers. The canvas was fixed to this structure by staples. Tension was not homogeneously spread over the surface of the canvas, generating a vertical sliding movement in the union crosspiece that led to breaks in the support.

Basically, the defects in the stretcher meant it was unable to take either the tensions or the weight of the canvas, causing serious damage to the support, which was clearly deformed in places [fig. 6] and showed breakages of different sizes [fig. 7] that affected the paint layers. At some points the paint had lifted and some important losses had occurred.

The information compiled on the support indicated a type of fabric that was too light, with a very open weft for a work with a surface area of more than 13 square metres of canvas. Further, the canvas bears a heavily impastoed paint layer consisting of numerous superimposed layers of colour. It is therefore reasonable to

6. Detail: deformations in the support and paint layer

7. Detail: tears in support and lifted paint

assume that the existence of a quite thick layer of glue on the canvas as *imprimatura,* implies that Balerdi was looking to reinforce the canvas to achieve a sufficiently resistant surface to take large quantities of paint and ensure greater durability.

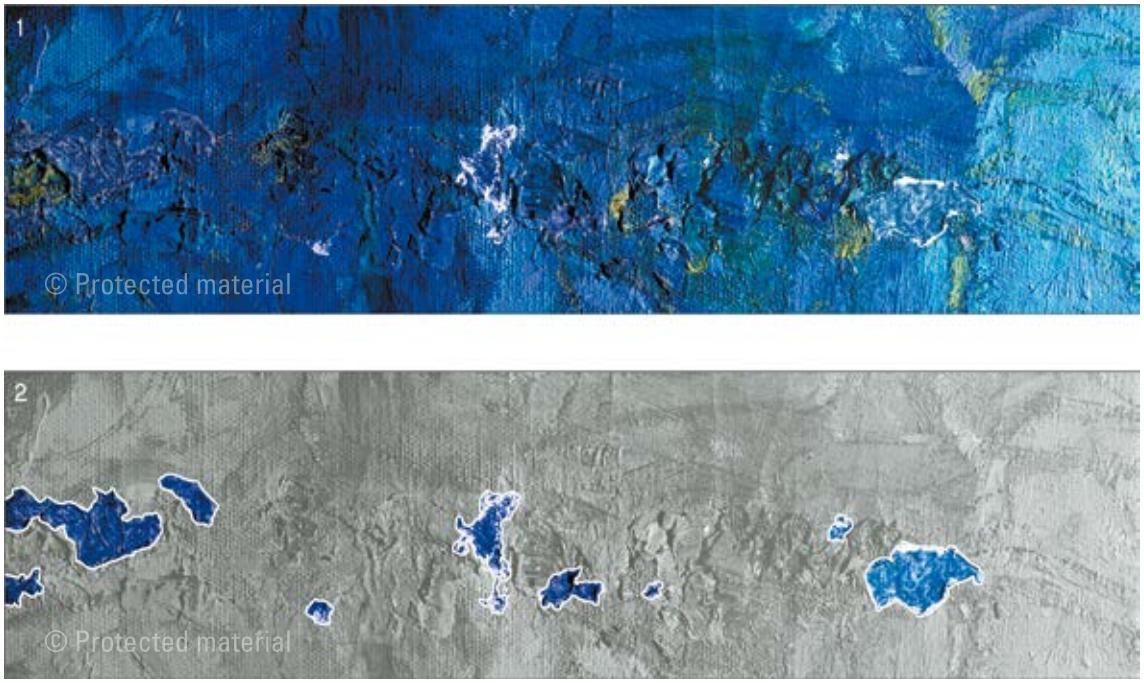
The glue used by the artist is animal-based and absorbs water, which means that this layer is very reactive to changes in relative humidity, absorbing or expelling water depending on climate changes and other factors. This process generates movements that, owing to the different nature of the materials used in the work (the canvas, also water-absorbing, layer of glue and colour), can eventually provoke fissures, while causing the paint to lift and losses in the paint layer.

Other decisive factors determining the mechanical strength of painting materials, apart from their actual nature, include the technique the artist employed when applying them to the surface, and their interaction with other materials resulting from subsequent intervention or restoration.

In this case, the artist has retouched the oil to repair losses of colour. The colour reapplied in most of these infills does not correspond to the adjacent colour.

Other materials not belonging to the original production were also found. These included adhesive, stuccos and watercolours, from repairs and other interventions designed to stop deterioration after the work had been executed.

A detailed study of these restored areas led us to conclude that the stuccos acted as a sort of wedge, lifting the original colour and seriously endangering adherence between support and paint layers [fig. 8].



8. Area where an intervention is clearly appreciable, in which the paint surface was restored, with stucco being added over the points where paint was lost, and watercolour applied afterwards in imitation of the original. The second image highlights the interventions in colour, which endangered the adherence of the original colour. Photograph 2 locates the added stuccos, which are appear mimetized in photograph 1

The condition report on *Big Garden* showed that both support and paint were seriously unstable. Tears, weakening of fibres and serious deformations in the canvas were all visible. Deficiencies in the stretcher were patent; fissures, lifted paint and paint losses were appreciable in the paint layer. Treatment would clearly need to involve restoration to stabilize the painting materials and a new mounting to guarantee conservation.

Treatment

Treatment began in 2002 with the tests needed to draw up a proposal to solve the serious conservation problems. First, we decided with the painting set vertically to work at the same time on the support and the paint layers [fig. 9].

To treat the latter we employed a technique we have been testing over the last few years, involving the use of a steam pencil to consolidate the paint layers in highly textured paintings with heavy impasto. The procedure consists in applying a short, slight blast of hot, humid air (humidity and temperature levels are regulated from the device's control panel) on the damaged area.

9. Consolidation with steam pencil and low-pressure mini-table on reverse

10. Mitka low-pressure mini-table working on the reverse of *Big Garden*

Although in most cases an adhesive is needed to fix the paint to the support, some cases have been described where adhesive was not required. The results obtained with this technique in the consolidation tests performed on *Big Garden* confirmed it as ideal for treating the pathologies of the paint in this particular work. An adhesive called *funori*, a polysaccharide sulphate obtained from the *gloiopeltis furcata* seaweed, was used as adhesive.

As regards the support, we were dealing with a large work where deformations affected the entire surface, which made access to the plane from the reverse vital to guarantee successful treatment. The low-pressure mini-table's versatility and effectiveness in ironing out deformations in textile supports is beyond question. This much-used technique consists in employing suction to apply controlled pressure on the back or reverse side of the canvas. Tests conducted on *Big Garden* at room temperature, after preliminary humidification of the zone needing treatment, were successful. We used the *Mitka* low-pressure mini-table [fig. 10].

A study of the results of the two procedures led to the idea of working simultaneously on the same surface with the steam pencil to consolidate the paint from the front and the Mitka low-pressure mini-table from the back to correct deformations. In this case, we demonstrated not only that the treatments were compatible but also that results of both were optimized by being performed at the same time.

The first phase went ahead after the paint surface had been treated with demineralized water to eliminate substances deposited by environmental pollution. The reverse was also vacuum-cleaned. Stucco and watercolour infills not belonging to the original production were eliminated, basically because, as explained above, they actually caused conservation problems. Watercolour pencils were used to retouch the losses.

11. Detail: perimeter of canvas before treatment

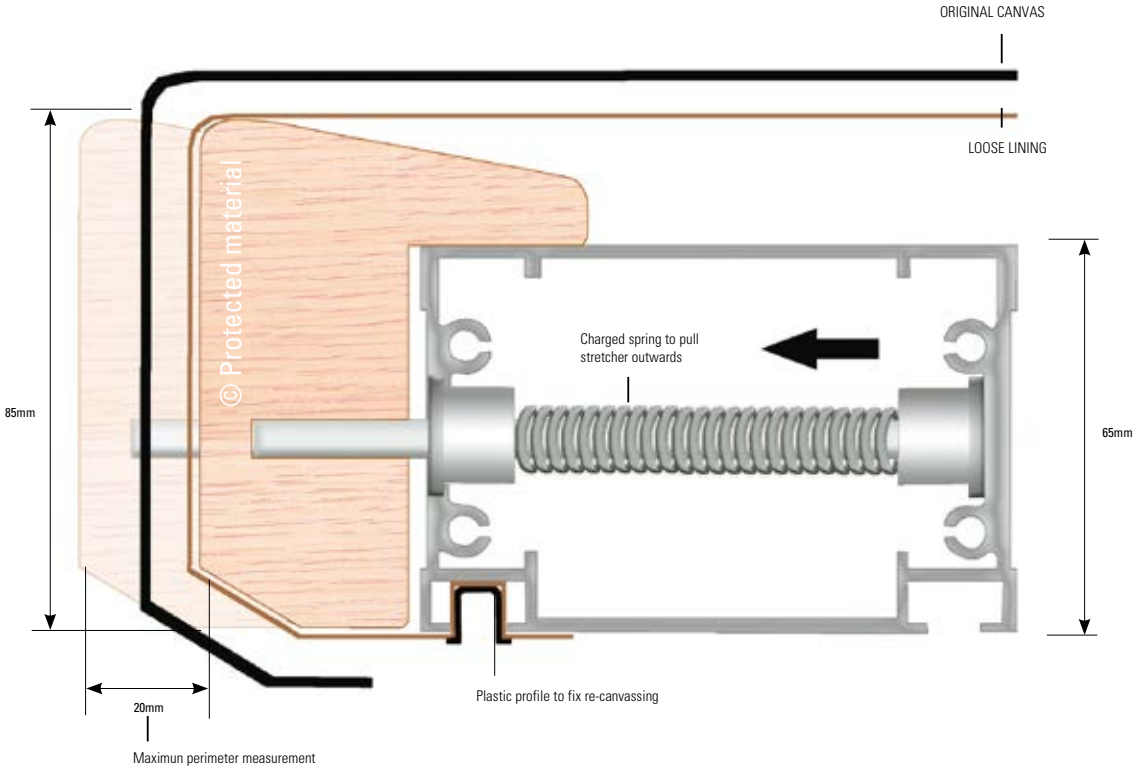
12. Detail: strip lining

Tears in the support were repaired with linen fibres and *beva film* thermoplastic adhesive.

Once the canvas had been taken off the old stretcher and placed horizontally [fig. 11] we applied the support deformation correction treatment and paint consolidation to the perimeter where strip lining were also stuck on with *beva film* [fig. 12]. We thus reinforced the entire perimeter area to assure correct support strength when remounting the painting.

The second phase of the treatment consisted in mounting the canvas on a new aluminium and wood self-tensing stretcher[3], specially designed for large paintings, facilitating homogeneous perimeter tension over the entire surface. It is an aluminium structure with compressed inner springs to regulate canvas tension [fig. 13].

3 The first self-tensing metal stretcher was designed and patented in 1967 as a conservation solution for large format textile supports. Based on research into adjustable expansion and tension, such stretchers are now available in a range of designs, some made entirely in aluminium, others in aluminium with a wooden perimeter

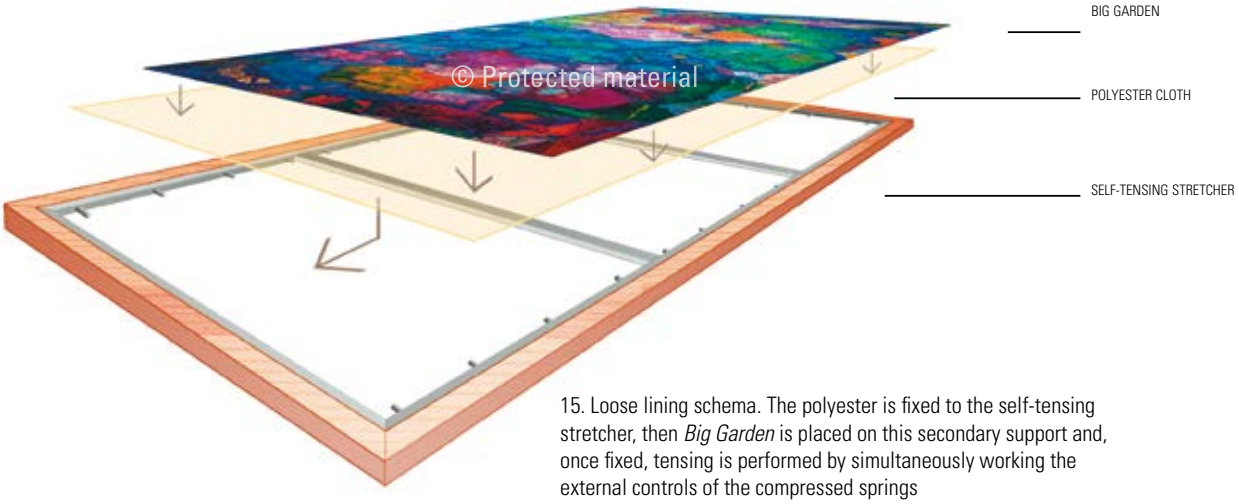


13. Transversal section of self-tensing stretcher

14. Detail of self-tensing stretcher

To mount *Big Garden* we decided on the model described above [fig. 14} as it was ideal for solving the specific conservation problems of this work and for use in the new canvas mounting with the loose lining system.

The original canvas was mounted and tensed on a secondary support of polyester previously installed on the self-tensing stretcher [fig. 15]. We selected this type of fabric, which is in direct contact with the reverse of the original canvas, because, being synthetic and fireproof, it reduces to the maximum the capacity for reacting to external agents. This system gave effective reinforcement for this large canvas without the need for adhesives



15. Loose lining schema. The polyester is fixed to the self-tensing stretcher, then *Big Garden* is placed on this secondary support and, once fixed, tensing is performed by simultaneously working the external controls of the compressed springs

or substances that might react and lead to alterations in the original materials. It is a reversible method permitting homogeneous tensing over the entire surface, absorbing and cushioning vibrations generated when the work is moved and acting as a filter when climatic conditions change.

Conclusions

The completion of this conservation and restoration work confirmed the effectiveness of the steam pencil combined with *funori* as a natural matt finish adhesive for consolidating paint. We consider working simultaneously with the low-pressure mini-table and the steam pencil to be a very positive experience because it optimizes and simplifies consolidation and textile support deformation correction procedures.

In remounting the painting, we demonstrated the benefits of loose lining as a system for strengthening the textile support, particularly as a minimum intervention reduces canvas reactivity to possible changes in environmental conditions and to the vibrations produced in shipping, with the only drawback of hiding the reverse of the original support. We also emphasize the advantages, tested and described, of the self-tensing stretchers for large format works.

Finally, we would like to stress the importance of preparing a complete, exhaustive documentary record of the pathologies for subsequent diagnosis and in determining and implementing the most suitable treatment for the work in question.

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