CHAPTER THREE
French masters of perspective:
Salomon de Caus, Niceron, Maignan

In the seventeenth century two men above all devoted themselves passionately to studies in the field of perspective. They were Salomon de Caus and Jean-François Niceron, the former an engineer and architect, the latter a scholar and mathematician.

Salomon de Caus (1576–1626) was born in the Dieppe region, but moved a great deal in Flemish and German circles in which anamorphoses seem to have been particularly in vogue. We see him in Brussels in the service of the Archduke Albert II of Austria (1605–10), next in England where he worked in the Richmond Gardens and in Greenwich Palace for Henry, Prince of Wales, then with Frederick V, Elector of the Palatinate and King of Bohemia (1619). He spent the final years of his life in France. A cosmopolitan and an intellectual with wide-ranging interests, he wrote on music, on automata, on solar clocks and on Euclidean proportions.¹ His book Perspective appeared in London in 1612 and in Paris in 1624.² In the sum total of his work, this book takes its place as one chapter of a vast treatise on the wonders of the world, in which the harmony of sounds and shapes, the mechanics of vision and of hydraulic machines are presented on the same level. Although the author writes in the sober style of a technician, he is deeply aware of the poetry of his subjects.

Jean-François Niceron (1613–46) (fig. 26), a Parisian of the Order of the Minims,* did very little travelling. He journeyed only to Rome, in 1635 and 1642, where he joined a group of other monks in the French monastery of Santa Trinità dei Monti, and became absorbed in work of a similar scientific nature. He died at the early age of thirty-three at Aix-en-Provence. He was acquainted with every treatise on perspective: of the Middle Ages – Vitellion and Alhazen; of the classical series – Alberti (1435), Viator (1505), Dürer (1525), Serlio (1545), Barbaro (1549), Du Cerceau (1576), Danti-Vignola (1583), Sirigatti (1596); of his immediate predecessors – Salomon de Caus (1612) and Marolais (1614); and of his contemporaries – Fernando di Diano (Polienus) (1628), Vaulezard (1630), Desargues (1636). The first edition of Niceron’s Curious Perspective is dated 1638.³ It was followed by a Latin version: Thesaurus Opticus, published in 1646, after his death.⁴

*See translator’s note p. 50
This was a much more developed work which served as a basis for further versions in French published in 1652 and 1663. It is a scientific work in which science unfolds in a fairy-tale atmosphere. The book’s subtitle: ’in which, besides being a summary and description of the general method of ordinary Perspective, practically demonstrated on the five regular bodies, is also taught the way of making and constructing all kinds of distorted figures which when seen from their correct viewpoint appear in correct proportion’, juxtaposes ‘Curious Perspective’ and ‘marvellous effects produced by artificial Magic’. Thus we also see magicians quoted: Pererius, Bulengerus, Torreblanca. And the effects of this magic are described as ‘the most beautiful and admirable that the art and industry of Man can achieve.’ In this connection Niceron, undoubtedly deriving his information from Cornelius Agrippa, refers to automata: the sphere of Posidonius which showed the movements and periods of the planets, the wooden dove of Architas which could fly, the automaton of Daedalus and ‘the bronze head made by Albertus Magnus which spoke as if by nature, and the wonderful works of the learned Boethius who made bronze snakes hiss and bronze birds sing. . . ‘. Conceived on the lines of a precision machine with its mechanism hidden, perspective that distances and diminishes, that shifts and animates forms in the universe of illusion, belongs to a similar order of miracles. Niceron stresses these connections:

If, I say, these authors ascribe these miraculous productions – [the automata] – and an infinity of others which we read about in books, to the power and operations of artificial Magic, we can certainly claim the same thing about the effects of perspective which are no less to be prized and admired. Philo the Jew in his book De Specialibus legibus states expressly in these terms that true magic or the perfection of sciences consists in Perspective, which enables us to know and discern more perfectly the beautiful works of Nature and Art and which has been at all times in high esteem not only among the common people but among the most powerful monarchs of the world.

Although Salomon de Caus was occupied simultaneously with the Reason of Moving Forces – automata – and with perspective as belonging to the same category, Niceron justifies himself with a whole piece of philosophical and historical reasoning.

Salomon de Caus devotes three chapters of his book to the method of ‘foreshortening in such a way that the said foreshortening will seem to be unnatural and extravagant, yet nevertheless seen from the chosen view-point will represent the object foreshortened as it would naturally appear’. Niceron has a whole book – the second – ’in which are set out the means for constructing several sorts of figures, which seen from elsewhere than the chosen view-point will seem distorted and senseless, but seen from the view-point will appear correctly proportioned’. The third and fourth books deal with catoptric anamorphoses and dioptric arrangements. They teach the mechanics of nonsensical, extravagant and distorted forms as an exact science. We are no longer concerned with empirical methods as in Vignola and Barbaro or even to some extent in Lomazzo, but with a science based on the geometry of visual rays and on precise calculations.
Let us sum up in a few words what had so far been the devices employed by artists for the organisation of their pictures according to normal perspective. First, the Horizon Line is drawn at eye level. Next two points are fixed: in the centre, the Principal Point towards which all the receding parallel straight lines converge; on the same horizontal line and at the same distance from the Principal Point as the eye, is the Point of Distance towards which the diagonal lines converge. To obtain the full effect, the spectator must place himself at a fixed viewpoint (fig. 27).

The space receding into the distance is thus divided by the drawing of the grid in which the distances corresponding to each square are determined by the intersections of two sets of straight lines. The result is a trapezoidal chequerboard on which all that now remains to be done is to place the figures, in proportion to the receding dimensions of the parallelograms. The system, in Italy often called *costruzione legittima*, goes back to Alberti (1435), Leonardo da Vinci (1492, MS.A. of the Library of the Institute of France), and Viator (1505). One sees it next in Vignola’s second rule, and it is taught in the majority of artists’ manuals. It corresponds to the reality of perception but it is also a device for representation which works in every situation. Reversed and extended, it also serves as a basis for a distortion ready for an optical correction.

The arrangement has a two-way function. If a square in perspective appears as a trapeze, a trapeze appears as a square: a reversal of the viewing point, placed above the Principal Point (at a height equal to its length away from the Point of Distance) and set in some way in the picture results in the opposite effect. The same diminutions correct the forms and bring them close instead of putting them at a greater distance and distorting them, as in a film running backwards. The perspective is in reverse.

Once the mechanics of the operation were found, attempts were made to increase the effect by exaggerating the proportions absurdly. This was achieved by pushing back the Principal Point and simultaneously closing up the Point of Distance. The
holding a mask (fig. 32), in Niceron, a chair (fig. 33) which, extended in a complex framework, turns into a bench like that in the picture of St. Anthony of Padua (fig. 13).

Special constructions were invented for creating elongated pictures. Niceron demonstrates a new arrangement which combines anamorphism with the cone, in some way reversing the positions: instead of being viewed from the side, the drawing is fixed obliquely at the necessary angle in relation to the viewer who is situated directly in front. Niceron provides all the possible variants. The figures
nails. With Fr. Du Breuil, cones and pyramids hung from the ceiling and were set on the floor and on tables. Whole rooms, veritable collections of conical perspective, were filled with these toys (fig. 35).

Similarly, anamorphic schemes on flat surfaces were not only applied to engravings or paintings done on an easel, but were also devised for the mural decorations of a 'gallery or room' (Salomon de Caus), as in Lomazzo’s description. The larger
the drawing, the more exact and ample is the effect; thus, some of these compositions are of enormous dimensions. Niceron lists three types, according to the viewpoint and its relation to the subject and its siting: 'optical' when one looks horizontally along a vast hall or gallery; 'anoptric' when one looks up towards the top of a very high wall, and 'catoptric' when one looks down, for example, from an open window, above a painting designed to be thus viewed. Introduced into the
classification of elongated pictures, these terms borrowed from Coelius Rhodiginus, refer to a vast programme. Fr. Du Breuil's Practical Perspective (fig. 36) shows how these schemes were worked out. We see two rooms filled with distorted images. There are giant strangely elongated heads on the walls, on the floor and ceiling, even on a table. Panels with holes through which people peer, analogous to the sighting-point on Vignola's frame, are arranged in front of some of these compositions. The commentary suggests that these images can either be painted or executed in marquetry. The rooms are like rooms of ghosts in which faces rise up on every side and vanish as one moves about.

Niceron also suggested these devices for the décor of ornamental caverns:

for those who work in them usually create masks, statues, satyrs and other grotesque figures made of shells, using their natural colour and outline according to what is most appropriate for the representation of certain parts. By applying these rules of perspective to shell-marquetry they can make distorted and confused figures which would not represent anything except from the predetermined viewpoint, and this will be all the more pleasing in that in these works which seem to call for nothing but simplicity, one will see perfect images and well composed pictures.

The cones and pyramids which one could hang up 'like the keystones in our churches' are particularly recommended for these caverns. Were any of these amorphic curiosities realized in important works? Niceron quotes and describes several examples which existed in his time, two of which are still preserved. In the edition of 1638 he praises one single great work. Others were added in the 1646 edition. The first is

a fresco in a chapel of our Monastery (of the Minims), of S. Trinità dei Monte Pincio in Rome, showing a Descent from the Cross in which Christ is so depicted that viewed from the left He seems to be lying down and leaning across the picture, with His right foot thrust out towards the left; but viewed from the other side His whole body appears almost vertical, much more foreshortened, and the foot which seemed to protrude on the left side appears to advance towards the right. The effect can be seen in the great altar of our church in the Place Royale where we possess a well made copy of this picture [fig. 37].

The original fresco which once surmounted the high altar of the Rovere Chapel in Rome was by Daniel Ricciarelli di Volterra, one of Michelangelo's immediate circle, who in the same church about the middle of the sixteenth century had executed an Assumption of the Virgin 'in which we note that in place of the Twelve Apostles he represented the most talented painters of his century'. Michelangelo is one of those so portrayed in the picture, which is still in situ in the Rovere Chapel. As for the Descent from the Cross, of which the Paris monastery possessed a copy, after several restorations and relaying onto canvas in the time of Napoleon I, it was relegated in 1855 to a side-chapel. Vasari refers to the foreshortenings in it as being of 'an unusual complexity and beauty'. With its confusion of figures, swaying in every direction, the whole picture explodes in a swirl of Baroque. While the optical
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Fig. 37 Daniel di Volterra: Descend from the Cross, S. Trinità dei Monti, Rome, mid-16th century

effects which struck Niceron were probably calculated ones, Volterra’s fresco was not yet a true anamorphism.

Compositions conceived in terms of recognized principles do not appear until the publication of the enlarged edition of *Thaumaturgus opticus*. They are representations of St. John the Apostle writing the Apocalypse and of St. Francis of Paola,* founder of the Order of the Minims and of the Monte Pincio Church, who was canonised in 1519. Francis was a friend of Louis XI, who sent for him before his death at Plessis-les-Tours. The first of these compositions was painted by Niceron himself in two spells – in Rome and then in Paris. The second is the work of Fr. Emmanuel Maïgnan. It remained intact in S. Trinità dei Monti in Rome, where it was a companion piece to Niceron’s anamorphosis, until it disappeared during vandalism perpetrated by French soldiers who occupied the monastery in 1798. There also existed in Paris a second fresco by Niceron which could still be seen in the eighteenth century. Two examples of optical illusion by Fr. Niceron, ‘one Mary Magdalene in Sainte-Baume in contemplation, the other, St. John the Evangelist on the island of Patmos, seated on an eagle,’ are mentioned by Désallier d’Argenville (1749) who saw them in the upper galleries of the cloister of the monastery of the Minims in the Place Royale (now Place des Vosges), founded by Marie de’ Medici and designed by François Mansart. Thierry (1787) describes the same paintings, emphasizing the strangeness of their effects: ‘as one approaches these two optical wonders, the main subject disappears and all one sees is landscape.’

The relations between the two Minim foundations, Roman and Parisian, were very close, and they cultivated the same sciences.

Maïgnan’s St. Francis of Paola is mentioned by Niceron as an example of anamorphosis, executed in grisaille: ‘One can also produce perspective effects in fresco, solely composed of black and white lines, such as the landscape done by Father Maïgnan, teacher of theology in the said [Roman] monastery.’ This fresco is a cartographical depiction of a bay, surrounded by steep mountains and vast barren plains, which unfolds along an upper gallery of the cloister (fig. 38). Light and shade extend along it and intertwine. They flow along in clearly defined areas as in enamels. Minute objects, reminiscent of those in etchings by Jacques Callot, are scattered here and there among these vast spaces: a harbour, a fortified town, turrets, domes, a church, a castle, isolated houses. People walk along the roads formed by the winding folds of the ground. Here and there are sailing-ships, and, in the centre, the Saint walking on the water in the Straits of Messina, borne up by his mantle. One can distinguish a cross and a rosary, drawn on the slopes of Calabria, the hermit’s native country. Olive trees, with an anamorphic branch,

*St. Francis of Paola (S. Francesco di Paola) was born in Calabria in 1416 and was the founder of the Order of Minims (lit. ‘the least’, or ‘the most humble’), vowed to charity, poverty and prayer. His order of Minims won many adherents in Italy and France. Louis XI hoped to gain through him the forgiveness of his sins, and his successor to the French throne, Charles VIII, was persuaded by Francis of Paola to build the church and convent of S. Trinità dei Monti, on the Monte Pincio hills, in Rome. A French foundation was later built by the Order in Paris, as is described in the text. Francis died in 1507 in France, honoured by Louis XII who, like his predecessors, greatly admired the holy man who was to be canonised so soon after his death.*
Fig. 38 Emmanuel Maignan: St Francis of Paola, anamorphic fresco in the cloister of S. Trinità dei Monti, Rome, 1642. Optical distortion and correction
frame the picture. A snail and a giant insect, placed on one of the gnarled tree trunks, introduce a marginal drollery.\(^1\)

It is from these images that the figure of St. Francis of Paola kneeling in prayer emerges when one stands at the end of the gallery. The maze of roads which compose the lines give the drawing a particular solidity.

Extending along a wall, this astonishing picture was composed on a new principle. The use of a geometrical grid would have produced satisfactory results, but Emmanuel Maignan, author of an important treatise on sundials, wished to do even better. It was in fact with strings representing the visual rays emerging from the eye that he organized the whole picture as it is seen by the visitor on entering the gallery by a side door. Maignan’s *Perspectiva horaria*, published in Rome in 1648, two years after Niceron’s *Thaumaturgus opticus* contains a technical description of the method and an engraving to illustrate it (fig. 39).\(^2\)

The system is a mechanical one, depending on a special apparatus like a miniature gibbet, fixed perpendicularly against the wall at a fixed distance from the viewing-point. On the horizontal bar DE, a movable string FH is fitted by means of a slipknot. The string’s position can be changed, and it is kept upright by means of a weight. A gemstone is threaded on it in such a way that it can be slid along and stopped at the desired height. A shutter LR, with two hinges, on which the image to be projected is fixed, is hooked on to the upright of the ‘gibbet’. Finally, a string NP, long enough to reach from one end of the gallery to the other, is attached in front of the entrance-door at eye-level. This completes the structure. It functions in three stages: 1 The shutter containing the image is folded back against the string
that holds the stone, and the stone is moved along to mark a precise point in the figure. II The shutter is then opened. The stone will then be in the air at the place corresponding to the point that it marked on the picture. This acts as a guide for the sighting. III The visual ray string is made taut, so that it first touches the stone and then meets the wall, fixing the projection exactly. By repeating the operation along the contours, one obtains the elongated transposition of the whole figure.

Such is this remarkable instrument. One is surprised to recognize in it Dürer's ‘window’ (1525; fig. 64), and even more to see the use to which the device is put, serving not to arrange but to distort perspective.21 The mechanics are the same: the frame (minus a stick), the hinged shutter, the strings – visual and sighting strings – later perfected by Accolti (1625).22 The two transverse strings intersecting inside the frame have been replaced by a single string with a pearl’ (Fr. Maignan’s ‘gemstone’) which is adjustable in height. However the apparatus works in reverse. In Dürer’s drawing, the object is set in front of the ‘window’ and it is on the hinged panel that its contours are marked with the aid of the visual string. According to Maignan, the subject is put on the shutter and is projected onto the surface in front of the frame. Reconstituted in every detail, one of the first known instruments of perspective is revived in the mid-seventeenth century by a French Minim, who furthermore acknowledges the prototype which inspired him.

Niceron suggested that the perspective apparatus invented by a Florentine artist, L. Cigoli (1559–1613) should also be used in reverse. This he had discovered in the collection of Hesselin, the king’s counsellor (a Wunderhammer in Paris), and had described as ‘catholic or universal’. One should note in this connection that
Galileo was in touch with Cigoli and in 1612 wrote to him on the subject of an elongated picture. He describes it as a human figure when seen from the side from a single fixed point, but when seen from the front as a chaos of lines and colours in which – with some difficulty – it is possible to find some resemblance to rivers, deserted beaches, clouds, lakes and ghostly forms. It presents a kind of allegorical poetry with a phantasmagoria of its own, in which the images and meanings flow out of each other and change according to the direct or oblique perspective of the concept. Galileo's comparison is valid for a large number of compositions which we have analysed and it provides an excellent definition of a poetic mechanism.

In the frescoes of St. John the Apostle, Niccone did not make use of the apparatus perfected in Florence, which was available to him, but rather of that of his colleague Maignan; without, however, abandoning linear methods. Always thinking as a geometrical, he used it not to bring back the image itself but just the outline. This permitted the simplification of the operation: the horizontal lines of the grid are drawn along the wall by means of lines led by a string fixed onto the Principal Point (F), while the vertical gradation is located with the help of another string that starts out directly from the Viewing-Point (A), in accordance with the Maignan system. As a result, the 'gibbet' is modified. Instead of a single movable string with a stone, there are several, which are weighted where the vertical division requires it and there is no 'guide'. To project this frame-work onto the wall, the procedure is as for an isolated point. Once the outline is obtained, all that is left is to draw the picture by following its successive elongations and expansions.

This was the hybrid technique, already described by Lomazzo with a more primitive frame, which was employed for the composition of St. John the Apostle.
and reproduced in *Thaumaturgus opticus* (fig. 40). Niceron quotes the dimensions of the Parisian cloister: 'length of wall 104 feet, height 8 feet, picture of the Saint, 54 feet'. (The outline of a person 1.80 m. is 18 m. wide.) Entering the gallery one sees the fresco correctly, since the view-point is by the entrance, but the figure melts away as one advances along the corridor. Seen at close range, it is a landscape as in Maignan's fresco. But it is not however a monochrome painting. Niceron explains:

I have followed the custom of the painters who clothe St. John in a scarlet robe, in order to paint on it several trees, shrubs, flowers, etc., which the people who walk along the gallery see directly, for the various adornments of the figures divert the spectators: but the painter must not include any item that interferes with the oblique view of this kind of Perspective.\(^4\)

The two superimposed images, one appearing and the other disappearing as the gaze shifts, as in Barbaro's description and in Schön's plates, constitute a vast ensemble carried out with perfected procedures.

The system produces the same effect as the changes of scenery in Baroque *divertissements* and spectacles. The aforementioned Hesselin, counsellor and overseer of the king's pleasures, called by Niceron 'one of the most exceptional men in the world', was celebrated for his theatrical receptions. 'His house is filled with curiosities: one sees such beautiful mirrors, so many rare paintings and delightful pieces in high and low relief, so many fine books about every branch of knowledge, that one could describe it as epitomising Parisian collections.'\(^5\) When, in 1656, in his Château d'Essonnes Hesselin received Queen Christina of Sweden, who knew him 'through his singular reputation as one of the most skilful and gallant
men in France', he led her into an enchanted dwelling: everything was illusion, everything moved and was transformed. The walls melted away, and one saw, in succession, vast halls, clouds bearing a city in flames, the chariot of Fame, 'a series of doors of several rooms, the first of which was guarded by two Swiss guards whom one took to be merely painted' but who moved away from the wall and executed a dance..., 'a cavern of extraordinary depth' which seemed to advance, revealing yet another cavern. By transformation and optical illusion, this unstable, fairy world unfolded in a continual anamorphosis. The fête galante in which visions were reincarnated and reabsorbed into other visions belongs to the same order of artifices as depictions of saints transformed into landscapes. The representation in the Château d'Essonnes was wholly based on systems of accelerated and false perspective, and it is quite possible that the illusions of appearance and disappearance were likewise produced with the aid of extended forms.

Hesselin shared with Niceron a passion for oddities and rare objects. His château, built around 1640 by Louis Le Vau in the Île Saint Louis, was not far from the monastery of the Minims and Niceron often visited it. There, as we have seen, he
came across Cigoli's instrument which he was able to use 'in reverse'. He even dedicated one of his books to Hesselin.27

The chronology of Niceron's large frescoes can be established exactly. In 1638 he mentions only the leaning Christ of the Descent from the Cross, Daniel di Volterra's original in the Roman monastery and his copy in the church of the Minims in Paris, placed above the High Altar about 1632. The picture greatly impressed Niceron, so that one might well ask whether it was not curiosity about how it was done that urged him into research on the subject. His first fresco of St. John was first painted in Rome where he was in 1642 and where Maignan, interested in his researches - indeed, Maignan said himself that he had been led by his Parisian colleague to concern himself with these problems - proposed his own method. Perhaps it was a matter of competition and compromise. Niceron began work on the Place Royale cloister frescoes on his return to Paris. According to the Annals of the Order of the Minims, 'Fr. Niceron executed the anamorphic painting of St. John the Evangelist on the island of Patmos in 1644, and in 1645 began the Mary Magdalene.'28 The work was interrupted in 1646 by a journey undertaken for
study, and in the same year Niceron died in Aix. This explains why the *Thomatisurgus opticus* does not deal with this second fresco. The *Annals* give us the additional information that the *Mary Magdalene* was completed in 1662 by Fr. Maignan, during a visit to the sister foundation. Since, however, Dezallier d'Argenville only mentions the drawing, Maignan's contribution was doubtless just a question of a retouching.

It was Paris that now became the important centre for the study and propagation of these optical contrivances. Even the Italians were to rediscover their own tradition through the influence of a Parisian monk and in a French monastery subsidized by the kings of France. Accolti's book, published in 1625, which shows an ear, whose elongation is determined by use of the visual ray method (fig. 41), as in Dürer's columns, mentions only a single example of anamorphosis: the portrait of the Grand Duke of Tuscany, Cosimo II, which can be linked with the first series of secret effigies of sovereigns. As late as 1642, Bettini, in his *Apiaria*, was still giving instructions on simple devices, even for catoptrics, for which in 1630 Vaulezard had established a rational geometrical system which will be the subject of the final chapters of this book. After its diffusion in Flemish and Germanic centres, anamorphosis was now re-thought and developed by a French School.

But what was that strange monastery, founded by Marie de' Medicis (whose first cousin was in fact portrayed in a picture with 'magic' perspective) where above the High Altar a tottering Christ could be seen and where the Minims as they prepared for meditation in the cloister were confronted with pictures of saints that expanded and diminished endlessly as in a nightmare? Was it a retreat for *illuminati* obsessed by their speculations? No: it was in fact a Cartesian centre.