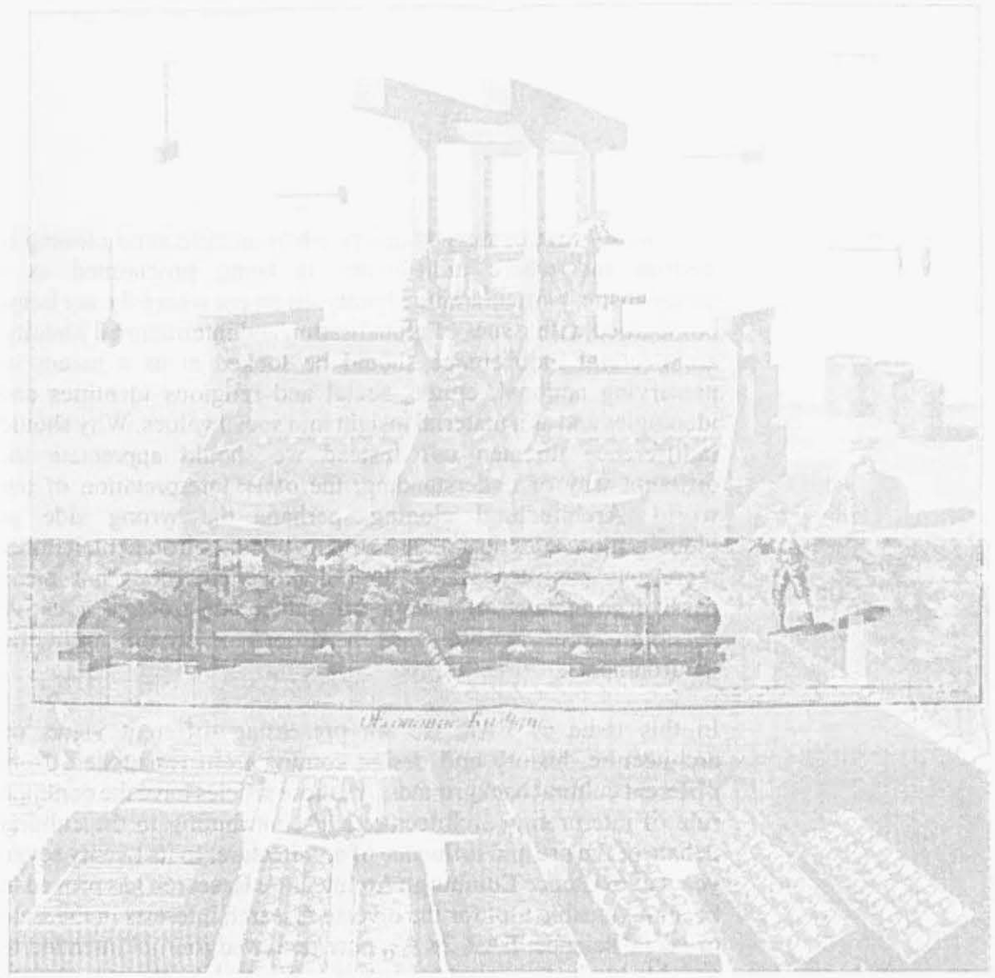
Garden and Landscape Subjects Portrayed in the Encyclopedie of Diderot and D'Alembert



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The French *Encyclopédie* had its origins in a putative project for a translation of Ephraim Chambers' *Cyclopedia.* [1] This enterprise was subsequently abandoned in favour of the more radical and all-embracing *Encyclopédie ou Dictionaire Raisonné des Sciences, des, Arts et des Métiers* (*Encyclopaedia or Analytical Dictionary of the Sciences, Arts and Crafts*). This great and justly celebrated work was to metamorphose into a veritable *machine de guerre.* [2] It is imbued with the reforming sprit of the Age of Enlightenment: it subscribes to the view that man is by nature good rather than evil, that he is open to the guidance of reason and is inclined to the humane; it promotes the idea of improvement through knowledge, learning and understanding; it places man at the focal point of human affairs and identifies with the Voltarian belief in a God who had created an orderly universe but who had removed himself from his creation to leave mankind to work out its own destiny. In the realm of everyday things the *Encyclopédie's* principal editor Denis Diderot, with his army of collaborators, elevated eighteenth-century understanding of the arts, crafts and manufactures to a new level. [3]

By its nature, the *Encyclopédie* was a vast undertaking that required the collective intellectual efforts, as just stated, of numerous contributors. These were the *savants* and *philosphes* who endeavoured to create a summation of the entirety of general human knowledge. They were guided in their work by Diderot. Diderot, one of the most brilliant and original thinkers of his age, was also an eminently practical philosopher and in the pages of the *Encyclopédie* he strove to exemplify the virtues of the craftsman and the artisan whose work he considered to be unjustly neglected. The many articles on garden and landscape subjects in the *Encyclopédie* exemplify very well Diderot's avowed intentions to: 'elucidate the true principles of things; record the relationships between subjects; contribute to the confidence and progress of human knowledge; multiply the number of true scholars, distinguished artisans and informed amateurs, and confer advantages to society at large'. In this context mention should also be made of the parallel contribution to the intellectual outlook of the *encyclopédistes*, and their working method, made by Diderot's co-editor Jean Le Rond D'Alembert. D'Alembert had particular affinities with the philosophy of Francis Bacon, another eminently practical philosopher, which he outlined in his epochal text *Preliminary Discourse* which opens Volume 1 of the *Encyclopédie.*

The purpose of this article is to provide the reader, unfamiliar with the *Encyclopédie*, with an outline of the part of the work that is concerned with subjects that have a direct bearing on the themes of gardens and landscapes. The limited scope available here inevitably allows only a brief overview to be made. This prompts me to add that the reader with a particular interest in these subjects will find them discussed more fully in *Gardens and Landscapes in the Encyclopédie of Diderot and D'Alembert*: *The Letterpress Articles and Selected Engravings*.[4] In this article I first briefly consider the publication history of the *Encyclopédie* by way of introducing the reader to the labyrinthine complexities of this multiple-volume work. I then proceed to the subject proper by discussing the garden and landscape subjects to be found in the *Encyclopédie* together with notes concerning their authors. Finally, to convey a flavour of the parent work, I include selected texts with specimen illustrations.

An outline of the publication history of the *Encyclopédie*

The publication of the *Encyclopédie* was a greatly protracted and turbulent affair. However, the numerous vicissitudes which beset the work fall outside the scope of my present theme and I confine myself here to the essential historical circumstances. The first volume of the *Encyclopédie* appeared on 28 June 1751. Volume II followed in January 1752 amidst a rising tide of disquiet in opposition to what was perceived as an excessive pervasive liberal attitude. This had been portended in the *Prospectus* which had preceded the work. Written by Diderot, this manifesto argued the case for an improved enlightenment to permeate throughout society. The political and social dimensions of this credo were to convulse France thirty years later. In the 1750s the disquiet caused by Diderot's writings were felt more by the clergy who judged the

tone of the *Encyclopédie* to be irreligious and anti-clerical. Diderot himself was considered to have about him the sulphurous aroma of Hades.

Matters came to a head with the publication of Volume III which appeared in November 1753 due only to the direct intervention of the administrator and statesman Chrétien-Guillaume de Lamoignon de Malesherbes who was, by virtue of his office, able to protect the *Encyclopédie*. De Malesherbes endorsed, as far as he was able, the concept of a free press and the tacit support he gave to the *Encyclopédistes* imparted added integrity to their work. (We should note in passing that de Malesherbes was eventually to pay for his loyalty to the *Encyclopédistes, and* their kind, years later on the guillotine with his head. This was an era when 'to go to the scaffold to die for one's beliefs' was more than a figure of speech.)

The turmoil and notoriety that surrounded the publication of the early volumes of the *Encyclopédie* served only to advance its cause. The curiosity of those hitherto unaware of what was happening was stirred and, in consequence, subscriptions poured into the coffers of the publishers at an ever-increasing rate. A landmark was reached with the appearance of Volume IV, in October 1754, which announced that no less a one than François Marie Arouet de Voltaire 'the eye of the Enlightenment' would commence making contributions with Volume V. His association with the *Encyclopédie* greatly enhanced the prestige of the work. Volume V subsequently appeared in November 1755 containing the promised set of Voltaire's texts. In total, Voltaire contributed forty-four articles from Volume V, as stated, through to Volume VIII. The steady rhythm of publishing a volume each year was maintained with the completion of Volume VI (October 1756) and Volume VII (November 1757), when a crisis occurred which imperilled the enterprise and threatened to see Diderot locked up in prison as had been his fate back in 1749 when he was incarcerated in the forbidding mediaeval fortress at Vincennes. The *Encyclopédie* was condemned for advancing subversive doctrines and the instruments of censorship were mobilised in the form of a decree which personally threatened anyone daring to publish anything contrary to the Church or state. As a consequence of all the turmoil, the cautious D'Alembert resigned as co-editor and thereafter confined his contribution to the writing of articles on mathematical and scientific subjects. The reforming *machine de guerre* was halted and no more text appeared for eight years. Pope Clement XII issued a decree requiring that all Catholics owning copies of the *Encyclopédie* should have the volumes burned by a priest or face excommunication.

The *Encyclopédie* was eventually resurrected through a combination of Diderot's indomitable spirit, the quasi-legal manipulations of de Malesherbes, the connivance of the publishers and, not least, the tireless energies of chevalier Louis de Jaucourt one of the principal contributors to the *Encyclopédie.* On 8 September 1759, de Malesherbes arranged for a new publication licence to be agreed. This made provision for the publication of the non-controversial, and visually arresting part of the *Encyclopédie*, namely, the celebrated eleven folios of plates

Recueil de mille planches . . . sur les Arts libéraux et les Arts mécaniques. At the same time, work was allowed to proceed on the remaining ten volumes of letterpress articles. With the publication programme restored, the first three of the eleven volumes of plates appeared between 1762 and 1763. Two years later, in December 1765, the remaining ten volumes of letterpress articles were published, although somewhat emasculated, in places, of their critical vigour. To ward off trouble with the censors, the principal publisher Le Breton had deleted, without Diderot's consent, what he considered to be contentious passages. This action mortified Diderot who had put his honour and reputation fearlessly at risk throughout the whole affair. He never forgave Le Breton for what he considered to be an *atrocité*. The remaining eight of the eleven volumes of plates were published between 1765 and 1772 to universal acclaim.

For convenience, a summary is presented in the following tables of the publication details of the letterpress volumes and the accompanying folios of plates. These provide additional information about the number of letterpress articles and the number of plates contained in the respective volumes.

Volume	Text	Total no. of entries	No. Of pages	Date of publication
I	A-AZ	5255	973	June 1751
II	B-CE	6634	877	January 1752
III	CH-CO	3766	922	November 1753
IV	CO-DI	5027	1102	October 1754
V	DO-ES	3500	1406	November 1755
VI	ET-FN	2427	936	October 1756
VII	FO-GY	3137	1077	November 1757
VIII	H-IT	3766	938	December 1765
IX	JU-MA	4240	956	"
X	MA-MY	3776	927	"
XI	N-PA	4477	963	"
XII	PA-PO	4056	965	"
XIII	PO-RE	4318	948	"
XIV	RE-SE	5065	949	"
XV	SE-TC	4583	950	"
XVI	TE-VE	4650	962	"
XVII	VE-ZZ	3141	890	"

Publication details of the 17 volumes of text of the *Encyclopédie*

Volume		Total no. of plates	Date of publication
I	Première livraison	251	1762
II	Second livraison première partie	206	1763
III	Second livraison deuxième partie	195	1763
IV	Troisième livraison	275	1765
V	Quatrième livraison	236	1767
VI	Cinquième livraison ou sixième volume	266	1768
VII	Sixième livraison ou septième volume	243	1769
VIII	Septième livraison ou huitième volume	227	1771
IX	Huitième livraison ou neuvième volume	210	1771
X	Neuvième livraison ou dixième volume	266	1772
XI	Dixième livraison	194	1772

Publication details of the 11 volumes of plates to the *Encyclopédie*

From the foregoing the reader will see how complex a work is the *Encyclopédie*. It does not, as a consequence, readily give up the treasures contained within its hundreds of pages, its thousands of plates and its millions of words. Subjects are scattered throughout the letterpress articles which, as can be seen from the first of the above tables, are arranged alphabetically. Moreover, the volumes have no index which makes finding a particular subject difficult and time-consuming.Things are a little easier in the case of the engravings which are grouped thematically, but even with these the engravings on a particular subject are frequently located under one or more subject headings. I will now consider these problems, allied to garden and landscape subjects, in the next section.

Garden and landscape subjects portrayed in the *Encyclopédie*

I will introduce this section with an autobiographical note. Mindful of the layout complexities inherent to the *Encyclopédie*, which I have briefly outlined above, some ten years ago I embarked on a detailed survey of the letterpress volumes and folios of plates with a view to creating various inventories of the contents. The resulting work was duly published see note 2. More recently, I returned to the *Encyclopédie*, in collaboration with Mrs Ann-Marie Thornton then of the Voltaire Foundation at the University of Oxford, to work in greater detail on the garden and landscape subjects. The results of our collaboration are listed in note 4. In this spirit, the next two paragraphs of my text are adapted, with occasional modifications, from Mrs Thornton's Preface to our combined study of the *Encyclopédie*.

'The articles on gardening in the *Encyclopédie* occupy an important and formative place in the history of alphabetically arranged horticultural encyclopaedias, of which *The New Royal Horticultural Society Dictionary of Gardening* is the present culmination. Miller's pioneering *The Gardener's Dictionary*, which replaced *The Gardeners' and Florists' Dictionary* of 1724, had appeared only one generation earlier, in 1731, and a single alphabetical sequence was not introduced until the sixth edition of 1752, following the precedent set by earlier pirate editions and translations of the work. The important eighth edition of 1768, which adopted the Linnaean system of binomial classification, post-dated the final volume of the *Encyclopédie* by only three years. The fact that the articles on gardening formed only part of a far more ambitious work of reference only enhances their contribution to this tradition, due to the pains taken by the editors of the *Encyclopédie* to situate this branch of human understanding within the framework of the encyclopaedic tree of knowledge contained in their Volume 1.

The *Encyclopédie* devotes no fewer than 741 articles to the subject, which, since they were published over a fourteen-year period, from 1751 to 1765, provide an invaluable reflection of how far and when the many new discoveries and innovations of the century came to be accepted and recommended by the contributors, within the constraints imposed by the *Encyclopédie*'s alphabetical arrangement. Moreover, in the work of reference which the *Encyclopédie* constituted, it seems only just that the contributors

should seek both to present a comprehensive account of contemporary experimentation, research, and publication on gardens and to place them in their historical context by referring to the leading authorities of the recent past and to the ancients. Most significantly, the articles on both gardens and landscapes allow one to see more clearly, perhaps, than hitherto the importance of translation as a means of disseminating new ideas throughout Europe at this time. There is still a tendency to believe that England and France had stereotypical notions of each other's landscapes during the eighteenth century, whereas all of the evidence points to the contrary: The *Encyclopédie* articles highlight the speed and eagerness with which the difficulties of translation were overcome by botanists, philosophers, and gardeners, intent on acquiring new knowledge which they subsequently enriched with their own findings and discussions. Originally conceived as a translation of Chambers' *Cyclopaedia*, the *Encyclopédie* provided an ideal forum for this particular type of intellectual exchange. At a time when French agriculture was beset with difficulties, notably peasant poverty and urban migration, France expressed a keen interest in English technological innovations. It is true that such interest was at first agricultural and horticultural rather than aesthetic, but Jaucourt's eulogy of the English landscape movement in article 'Jardin', though seemingly inspired by Milton rather than by any specific English garden, constitutes far more than a passing tribute: Jaucourt laments the decline in the standard of landscape design in France to the same degree that he scorns contemporary contributions to literature in article 'Imitation'. The debate on the reception of the English landscape movement in France is not closed and the *Encyclopédie* articles may well furnish new material for discussion, though the contributions of Le Nôtre and La Quintinie to French garden history did prove more lasting than other influences and the *Encyclopédie* articles provide an accurate reflection of this.'

Turning now to the subject matter of the articles themselves, these cover the entire domain of garden and landscape literature. Within the constraints of what was known in the eighteenth century, the contributors to this part of the *Encyclopédie* discuss all conceivable aspects of flowers, shrubs and trees and many related subjects.

Thus, by way of illustration, the reader is acquainted with botanical and related technical terms, plant species, plant habitats, the optimum conditions for growth, diseases of plants and the principles for garden maintenance. The larger concepts of landscape design are also considered including such subjects as the layout of formal gardens, the design of parterres and the effects to be achieved with water fountains. Some articles are short, definition-like texts that are concerned with the meanings of terms; others amount to major treatises and extend over several folio pages. These give fascinating insights into eighteenth-century gardening practice at a period when travellers and explorers from remote parts of the world were returning to Europe with new and quite unknown plants and botanical specimens.

In the *Encyclopédie* the articles on garden and landscape subjects are distributed in alphabetical order throughout the seventeen folio volumes of letterpress articles sandwiched in between a multitude of other subjects. One of the bye-products of my research has been to collect these articles together and unify them into an orderly arrangement. A complete listing here of these texts is beyond the scope of this article. These will be found at pp 183192 in *Gardens and Landscapes in the Encyclopédie* see note 4. to give some idea of the arrangement of the articles and, more importantly, to convey an impression of the range of their subject matter, here is an extract from my list of articles as they commence alphabetically at letter 'A':

Adonis	(adonis)
Age	(age)
Agrafe	(agrafe)
Agriculture	(agriculture)
Air	(air)
'Alberge' peach	(alberge)
Alder	(verne)
Alder plantation	(aulnaie, †vernage)
Align, to	(affiler, aligner)
Althaea officinalis	(althe à-frutex)
Amaranthus	(amarante)
Amaranthus caudatus	(passe-velours)
Ameliorate, to	(améliorer)
Ampelopsis	(vigne-vierge)
Anatomy of plants	(anatomie des plantes)
'Andilly' peach	('Andilly')
Anemone bulbs	(pattes)
'Angobert' pear	('Angobert')
Animals, to destroy	(†détranger)
Antirrhinum	(Anthirrinum)
Apple	(pomme)
Apple orchard	(pommeraie)
Apple tree	(pommier)
April, nipping winds of	(roux-vent)
Arcade	(arcade)
Aspen plantation	(tremblaie)
Aster	(†*Aster atticus*)
Atriplex	(bonne-dame)
Attache	(attache)
Attached to a tree, to be	(tenir à l'arbre)

Having discussed the letterpress articles on garden and landscape subjects, albeit briefly, I will now pass a few remarks concerning the contributors to these writings.

Contributors to the letterpress articles on gardens and landscapes

The contributors to the letterpress articles to the *Encyclopédie* were not a homogenous group; they had a multiplicity of different backgrounds, material well-being, social connection, intellectual orientation and vocational disposition. Some contributors undertook the work involved (often very considerable) because they needed the money (often a mere pittance) and others were seconded to the project because they were recognised national authorities on the subject (notably Antoine-Joseph Dezallier d'Argenville see below). A few in fact only a very few contributed texts for the honour and glory of the work and to promote the *Encyclopédie* on its way (notably Chevalier Louis de Jaucourt see below). In the present state of knowledge it is thought that about 130 men and one woman contributed articles to the *Encyclopédie*. Many unsigned articles remain to be identified. From this large group of individuals, we (Mrs Ann-Marie Thornton and myself) have identified nine principal contributors to the writings on

garden and landscape subjects. Each of these contributors, as was the custom in the written part of the *Encyclopédie*, signed his articles with an identifying letter Diderot reserved the asterisk for his exclusive use. Below I list the nine individuals to whom I have made reference and for each I provide brief biographical details together with references to some of their more important articles on the subjects under consideration. I should add that I am indebted to my co-reseracher Mrs Thornton for the remarks below concerning Bellin and Louis and Pierre Daubenton.

Jacques-Nicolas Bellin (170372)
A hydrographic naval engineer who contributed over 1,000 articles to the *Encyclopédie* (signed Z), the majority on maritime subjects. He composed article *Halime* on gardening.

Jacques-François Blondel (170574)
Blondel was professor at the *Ecole des arts* when he started to contribute to the *Encyclopédie*. By then he had established a reputation both as a writer on, and engraver of, architectural subjects. The Editors introduce him as: 'An architect celebrated not only for the several works which he executed in Paris and for the others for which he has made designs and which have been executed ... for his *Traité de la Décoration des Edifices*, whose highly esteemed plates he engraved himself.' His contributions are confined largely to the architectural subjects in the first seven letterpress volumes. He also prepared commentaries for several of the plates. Blondel signed his articles with P. He contributed five entries on gardening, in Volumes I and IV.

Louis-Jean-Marie Daubenton (17161800)
Born in Montbard in Burgundy, Daubenton assisted his compatriot Buffon at the Jardin du Roi in Paris. In July 1793, he became director of the Musée National d'Histoire Naturelle. The main contributor on Natural History, he wrote 900 articles, including articles *Aile* and *Marcotte* on gardening. His articles are signed I or Daubenton.

Pierre Daubenton (170376)
Pierre was the elder brother of Louis-Jean-Marie, who enlisted him as a contributor to the *Encyclopédie*. He was subdelegate, lieutenant general of police, and mayor (175668, 177276) of Montbard, where, from 1760, he created a tree nursery of international repute. He composed some 45 articles (22 on gardening) which are signed c or D'Aubenton and of which all but *Lacet* concern arboriculture.

Antoine-Joseph Dezallier d'Argenville (16801765)
D'Argenville was born in Paris and studied both law and the fine arts, the latter with the architect Alexandre Le Blond. He published *La Théorie et la Pratique de jardinage* in 1709, a later edition (1747) of which served as the primary source for d'Argenville's contributions to the *Encyclopédie*. These number almost 600. He also assisted in the preparation of the engravings on gardening (Volume 1 of the plates). D'Argenville contributed throughout the *Encyclopédie* but his entries are few in the last ten letterpress volumes. D'Argenville is described by the Editors as being an

authority on Gardening and Hydraulics relevant to the articles and plates concerned with water fountains. He was the author of a work entitled *Théorie et la pratique du Jardinage avec un Traité d'Hydraulique* whose merit and utility are proved by its four editions in Paris. D'Argenville's articles cover fruit, kitchen and legume gardens, methods of pruning trees, new inventions allied to gardening, techniques for raising water, descriptions of sluices and constructions built in water.

D'Argenville's most substantial articles on garden-related subjects are: *Aligner*, *Allées de jardin*, *La fleur*, *Ame de Plantes*, *Ameliorer*, *Anatomie des Plantes*, *Arcade*, *Arroser*, *Biais*, *Bosquet*, *Branches*, *Casse Motte*, *Choux*, *Courge*, *Crossette*, *Cueillette*, *Cycleman*, *Décoration*, *Distribution*, *Dresser*, *Eau*, *Ebourgeonner*, *Ecorce*, *Maniere d'avoir de beaux fruits*. D'Argenville identified his articles with a K.

Denis Diderot (171384)
As Chief Editor to the *Encyclopédie*, Diderot contributed on a wide range of subjects which are signed *. He contributed 15 entries on gardening, including *Arbre* (*le jardinier*) and a section on perspective in *Allées de jardin*. He also composed the substantial texts to *Agriculture* and *Economie rustique*.

Chevalier Louis de Jaucourt (170480)
Jaucourt was the most prolific of all contributors to the *Encyclopédie*. He identified his articles with the initials DJ. He was born into an aristocratic family from which he derived his title. Although the beneficiary of great inherited wealth this did not distract him from hard work and close scholarly study. He attended the Acedemie de Genève, visited England where he acquired a working knowledge of English and attended the University of Cambridge. From 1728 he studied at the University of Leyden where he earned a doctorate in medicine. Returning to France his secure financial position enabled him to settle into an idyllic existence of scholarly study surrounded by his family estates he owned land 'as far as the eye can see'. Writing of Jaucourt, Voltaire described him with a characteristically sharp focus as an:'*homme au-dessus des philosphes de l'antiqiuité, en infatigable, à tous les avanteges que pouvait lui procurer sa naissance, dans un pays où l'on préfèr cet avantage à tout reste, excepté à l'argent.* When engaged on the *Encyclopédie*, Jaucourt typically worked for thirteen hours a day surrounded by four or five personal secretaries. He composed 66 entries on gardening.

Paul Landois
Landois is one of the more shadowy and enigmatic contributor to the Encyclopédie. Diderot recruited him in recognition of his artistic sensitivity and as being a connoisseur of painting, sculpture and engraving to which he contributed over 100 articles identified with an R. He wrote *Estropier* on gardening.

Jean-Baptiste Le Roy (17201800)
Le Roy was one of the earliest contributors to the *Encyclopédie*, being recruited to the enterprise in 1747 shortly after Diderot and D'Alembert had taken up their positions as Editors. His family background in horology (his father was clockmaker to the King) and scientific instruments qualified him to write primarily on

technological subjects identified with the letter T. His interests were wide: he researched street lighting, water purification, sanitary hospital construction and electrical discharge by lightening conductors. He composed the article *Echapper* on gardening.

Garden and landscape subjects portrayed in the engravings to the *Encyclopédie*

In their creation of the *Encyclopédie* the Editors, particularly Diderot, placed the utmost importance on visual illustration as a means of both communicating and celebrating their material. Accordingly, great pains were taken with the engravings and the plates which accompany the *Encyclopédie* have been universally admired since the time of its publication. Wherever possible, the Editors selected plates for publication so as to exemplify such consideration as: the portrayal of landscape scenes; the art of technical illustration, e.g. plans, sections, elevations and perspective views; descriptions of eighteenth-century processes and equipment; and, not least, the incorporation of the human form. Concerning the latter, Diderot's own ideal was that subjects involving workmanship should be explained so that 'the principal operation in one or several plates [is illustrated so that] one sees … the hands of the artisan in action, and sometimes the whole person of the artisan, working at the most important production of his art'.

As in the case of the letterpress articles, the plates concerning a particular subject are frequently distributed under several headings throughout the various folio volumes. This is the case with garden and landscape subjects. In my study of the *Encyclopédie* I have collated these into a thematically unified group. In this form, the engravings (plates) on garden and landscape subjects are as follows:

Ploughing and tilling: 5 Plates
1. Ploughing, tilling and cultivating the land.
2. Plough with a mouldboard.
3. Plough with symmetrical ploughshares.
4. Harrows and rollers.
5. Ploughing furrows in sequence and kiln drying of turf.

Sowing machine: 3 Plates
1. Hand-propelled sowing machine.
2. Technical details of Plate 1.
3. Seed-distribution mechanisms.

Hay making and harvesting: 1 Plate
1. Hay making and agricultural tools.

Threshing in the barn: 1 Plate
1. A pictorial scene of threshing within a barn.

Methods of preserving grain by the application of heat: 3 Plates
1. Stone kiln for grain drying.
2, 3. Two plates combined illustrating stoves and grain-drying facilities.

Windmills and watermills: 9 Plates
1. Pictorial view of a windmill.
2. Technical details, structural parts and operating mechanism.
3. Cross section, sails and details of gear wheels.
4. Interior view of a windmill.
5. Grain feed, grindstone and sieve apparatus.
6. Undershot waterwheel.
7. Bascule watermill.
8. Hydraulic mechanism for a bascule watermill.
9. Hand-operated milling mechanisms.

Mills for processing fruit, seed oil and tobacco: 3 Plates
1. Double plate illustrating a rotating mill for crushing olives.
2. Drop-hammer mill for extracting linseed oil.
3. Mill mechanisms for processing vegetables and tobacco.

Processing of tobacco: 6 Plates
1. Scene within a tobacco warehouse.
2. Processing of tobacco.
3. Coiling and cutting tobacco.
4. Pressing and shaping of tobacco.
5. Technical details of a tobacco press.
6. Binding and trimming tobacco *carottes*.

Processing of hemp: 2 Plates
1. Hemp-processor's workshop.
2. Workshop and equipment for processing hemp.

Cultivation and hand-working of cotton: 1 Plate
1. Scene depicting an American cotton plantation combined with other images associated with cotton.

Processing and weaving cotton: 4 Plates
1. Master weaver's workshop and hand-operated cotton mills.
2. Methods of brushing cotton.
3. Hand-processing cotton.
4. A master weaver at his loom combined with technical details of the loom.

Viticulture Cultivation of grapevines: 2 Plates
1. Layering and planting of vines.
2. Vine cultivation and the handtools required.

Wine presses: 3 Plates
1. Wine press construction.
2. Double plate illustrating a double-coffer wine press.
3. Wormgear arrangement for a wine press.

Cider presses: 2 Plates
1. Beam-type cider press.
2. Technical details of a beam press.

Extraction of indigo and manioc: 1 Plate
1. Plantation for the cultivation of the indigo plant combined with the processing of manioc.

Sugar extraction and refining: 7 Plates
1. Impressions of a sugar plantation.
2. Sugar mills.
3. Sugar refining.
4. Sugar refinery.
5. Details of a large-scale sugar refinery.
6. Sugar warehouse.
7. Interior of a sugar warehouse.

Manufacture of clogs and vine poles: 1 Plate
1. Manufacture of wooden clogs and vine poles.

Manufacture of charcoal: 3 Plates
1. Woodland scene depicting the craft of the charcoal burner.
2. Woodland scene depicting the craft of the charcoal burner.
3. Tools and equipment of the charcoal burner.

Kiln for converting lime: 1 Plate
1. Kiln for calcining lime.

Gardening and landscape: 7 Plates
1. Tools and equipment of the landscape gardener.
2. Tools and equipment of the landscape gardener.

3, 4, 5, 6. Designs for decorative flower beds based upon geometrical constructions.
7. Machine for uprooting tree stumps.

Kitchen gardens: 5 Plates
1. Pictorial view and plans of a kitchen garden.
2. Heated greenhouse within the gardens of the Trianons.
3. Dutch-style heated greenhouse.
4. Greenhouse for rearing diverse species of plants requiring different environmental conditions.
5. Greenhouse designed for the climate of Uppsala.

Water engineering: water supply, artificial ponds and fountains: 4 Plates
(Plates 1 and 2 are combined into a single engraving.)
1. Tools and equipment of the water engineer.
2. Principles of surveying using the hydrostatic level.
(Plate 2 is continued and combined with Plate 3.)
3. Applications of hydrostatic engineering.

4. Water-retaining constructions for ornamental ponds.
5.* Designs for ornamental basins and reflecting pools.

Bee keeping and the production of honey: 1 Plate
1. Pictorial scene depicting apiaries and bee hives.

Sericulture: silkworm cultivation: 1 Plate
1. The conditions and equipment required for sericulture.

A farmyard: 1 Plate
1. Artist's impression of a farmyard and its associated buildings.

Dairy farming: 1 Plate
1. Dairy on the estates of a noble family.

The art of incubating hens' eggs and hatching chickens: 3 Plates
1. Principles of egg incubation and the equipment required.
2. Constructions for incubators and illustrations of chicken development.
3. Designs of enclosures and feeding boxes for chickens.

Ploughing and tilling: 5 Plates
1. Ploughing, tilling and cultivating the land.
2. Plough with a mouldboard.
3. Plough with symmetrical ploughshares.
4. Harrows and rollers.
5. Ploughing furrows in sequence and kiln drying of turf.

Sowing machine: 3 Plates
1. Hand-propelled sowing machine.

2. Technical details of Plate 1.
3. Seed-distribution mechanisms.

Hay making and harvesting: *1 Plate*
1. Hay making and agricultural tools.

Threshing in the barn: *1 Plate*
1. A pictorial scene of threshing within a barn.

Methods of preserving grain by the application of heat: 3 Plates
1. Stone kiln for grain drying.
2, 3. Two plates combined illustrating stoves and grain-drying facilities.

Windmills and watermills: 9 Plates
1. Pictorial view of a windmill.
2. Technical details, structural parts and operating mechanism.
3. Cross section, sails and details of gear wheels.
4. Interior view of a windmill.
5. Grain feed, grindstone and sieve apparatus.
6. Undershot waterwheel.
7. Bascule watermill.
8. Hydraulic mechanism for a bascule watermill.
9. Hand-operated milling mechanisms.

Mills for processing fruit, seed oil and tobacco: 3 Plates
1. Double plate illustrating a rotating mill for crushing olives.
2. Drop-hammer mill for extracting linseed oil.
3. Mill mechanisms for processing vegetables and tobacco.

Processing of tobacco: 6 Plates
1. Scene within a tobacco warehouse.
2. Processing of tobacco.
3. Coiling and cutting tobacco.
4. Pressing and shaping of tobacco.
5. Technical details of a tobacco press.
6. Binding and trimming tobacco *carottes*.

Processing of hemp: 2 Plates
1. Hemp-processor's workshop.
2. Workshop and equipment for processing hemp.

Cultivation and hand-working of cotton: 1 Plate
1. Scene depicting an American cotton plantation combined with other images associated with cotton.

Processing and weaving cotton: 4 Plates
1. Master weaver's workshop and hand-operated cotton mills.
2. Methods of brushing cotton.
3. Hand-processing cotton.
4. A master weaver at his loom combined with technical details of the loom.

Viticulture Cultivation of grapevines: 2 Plates
1. Layering and planting of vines.
2. Vine cultivation and the handtools required.

Wine presses: 3 Plates

1. Wine press construction.
2. Double plate illustrating a double-coffer wine press.
3. Wormgear arrangement for a wine press.

Cider presses: 2 Plates
1. Beam-type cider press.
2. Technical details of a beam press.

Extraction of indigo and manioc: 1 Plate
1. Plantation for the cultivation of the indigo plant combined with the processing of manioc.

Sugar extraction and refining: 7 Plates
1. Impressions of a sugar plantation.
2. Sugar mills.
3. Sugar refining.
4. Sugar refinery.
5. Details of a large-scale sugar refinery.
6. Sugar warehouse.
7. Interior of a sugar warehouse.

Manufacture of clogs and vine poles: 1 Plate
1. Manufacture of wooden clogs and vine poles.

Manufacture of charcoal: 3 Plates
1. Woodland scene depicting the craft of the charcoal burner.
2. Woodland scene depicting the craft of the charcoal burner.
3. Tools and equipment of the charcoal burner.

Kiln for converting lime: 1 Plate
1. Kiln for calcining lime.

Gardening and landscape: 7 Plates
1. Tools and equipment of the landscape gardener.
2. Tools and equipment of the landscape gardener.

3, 4, 5, 6.* Designs for decorative flower beds based upon geometrical constructions.
7. Machine for uprooting tree stumps.

Kitchen gardens: 5 Plates
1. Pictorial view and plans of a kitchen garden.
2. Heated greenhouse within the gardens of the Trianons.
3. Dutch-style heated greenhouse.
4. Greenhouse for rearing diverse species of plants requiring different environmental conditions.
5. Greenhouse designed for the climate of Uppsala.

Water engineering: water supply, artificial ponds and fountains: 4 Plates
(Plates 1 and 2 are combined into a single engraving.)
1. Tools and equipment of the water engineer.
2. Principles of surveying using the hydrostatic level.
(Plate 2 is continued and combined with Plate 3.)
3. Applications of hydrostatic engineering.
4. Water-retaining constructions for ornamental ponds.
5. Designs for ornamental basins and reflecting pools.

Bee keeping and the production of honey: 1 Plate
1. Pictorial scene depicting apiaries and bee hives.

Sericulture: silkworm cultivation: 1 Plate
1 The conditions and equipment required for sericulture.

A farmyard: 1 Plate
1. Artist's impression of a farmyard and its associated buildings.

Dairy farming: 1 Plate
1. Dairy on the estates of a noble family.

The art of incubating hens' eggs and hatching chickens: 3 Plates
1. Principles of egg incubation and the equipment required.
2. Constructions for incubators and illustrations of chicken development.
3. Designs of enclosures and feeding boxes for chickens.

Garden and landscape subjects: selected engravings and their accompanying texts

To illustrate the *encyclopédistes'* visual portrayal of garden and landscape subjects I include in this section a small selection of engravings together with translations of the original texts in some places these incorporate additional textual commentaries

of my own. Before I proceed further, it will be helpful to say a few words about the original texts and the layout principles adopted by the Editors of the *Encyclopédie*.

In the first instance, for each plate, my text has been derived from the *explication* accompanying the original. As the reader will see, each engraving is composed, typically, of several individual pictorial images that the original artist-illustrators identified by individual *Figure* numbers. These are, in many cases, elaborated with additional numbers and upper and lower-case letters for the purpose of identifying features of particular interest. I have followed the principle adopted by the *Encyclopédistes*, namely of structuring my text around these individual figures. I should note here that it is quite remarkable, given the scale and complexity of the illustrated part of the *Encyclopédie*, that the teams of artist-illustrators, and the Editors, were able to achieve such high standards of consistency and accuracy in correlating text and visual image.

Adopting the procedures just described, the texts which accompany my selection of plates are, more or less, a direct translation of the original. In several cases, however, the texts have been elaborated to provide additional information and to more fully exploit the scope and interest of the engravings.

Ploughing and Tilling

There are five plates in this sequence which illustrate different types of plough, tilling equipment and methods of cultivating the land. The notes to Fig. 3 of this plate (see below) provide evidence of the diligence with which the Editors to the *Encyclopédie* researched the subjects they selected for inclusion, striving, in this case, to incorporate the latest methods available to the farmer of working the land.

Plate I
Scenes depicting ploughing, tilling, cultivating the land and the equipment required to perform these operations.

This is a fitting engraving with which to commence our series. It embodies the picturesque characteristics typical of the work of the artist-engravers who illustrated the *Encyclopédie*, namely, a facility for combining technical accuracy and authenticity with pictorial charm and refinement.
In the upper part of the engraving, farm workers animate a landscape of idealized, rural charm. A hamlet, complete with a windmill nestles below a monastery and in the foreground an elaborately drawn tree frames the composition. Below, and in the distance, farm workers go about their labours. Note how the artist has exaggerated the perspective-scale of the figures in the distance in order to portray them more clearly.

Fig. 1. Ploughman who is working a furrow.

Fig. 2. An ordinary or commonplace plough.

Fig. 3. The plough of Mr Jethro Tull. This illustration is a good

example of the manner in which the engravings to the *Encyclopédie* frequently portray eighteenth-century state-of-the-art technological innovations. Jethro Tull (16741741) was one of the most celebrated improvers of agriculture of his day. He invented a seed drill which sowed seeds in rows, thereby facilitating cultivation in-between the crops. It was whilst travelling in France and Italy and observing the vineyards that he became aware of the great benefits to be derived from systematic and careful plant cultivation. On his return to England he developed theories of plant nutrition and designed a horse-drawn hoe. He subsequently published (1731) his ideas in *The New Horse Houghing Husbandry*: *or, an Essay on the Principles of Tillage and Vegetation* which he revised and expanded in 1733 just a few years before Plate I was engraved. His methods, although initially condemned largely on account of their novelty, conserved seed and kept down weeds. Tull's ideas ere quickly adopted by landowners in the United Kingdom and beyond.

Fig. 4. A sower is guiding a seeding machine, the design of which is attributed to the abbé Soumille. The device is wheeled along the furrow in which seed is deposited and then directly covered over by the soil. This is turned by the mouldboard of the plough (Fig. 1) when forming the next furrow, as indicated by the dotted line: the mouldboard is the curved plate on a plough which turns over the furrow.

Fig. 5. A sower scatters seed, by hand, on a piece of ground that has been prepared by various farm workers.

Fig. 6. A carter leads a horse which is drawing a harrow by means of which the scattered seed is covered over with top soil.

Fig. 7. A carter leads a horse drawing a cylindrical harrow, which beats the cultivated ground, rendering its surface more uniform.

Manufacture of Charcoal

There are three plates in this sequence which illustrate the conversion of wood into charcoal. Charcoal has been used by man for centuries with regard to such applications as: a source of heat; a medium for cooking; in medicinal treatments; a material for artists; and in the smelting of ores and the melting of glass for which the capacity of charcoal to achieve very high temperatures is invaluable.

Plate II
To illustrate the craft and skills of the charcoal burner, the artist has employed a similar style of visual imagery to that portrayed in the previous engraving in order to create another picturesque woodland scene of considerable enchantment complete with a ruined castle and a distant outline view of a village.
The upper part of the engraving illustrates the charcoal kilns in various stages of combustion as the mounds of wood are gradually converted into charcoal.

Fig. 4. A workman mounted on a ladder ignites a kiln constructed

according to the first method by lighting a small pile of brushwood placed at the apex of the mound.

Fig. 5. A workman tends a kiln constructed according to the second method by lighting the kiln at a series of vent holes created as previously described and illustrated at k in Plate I, Fig. 2. This kiln is well alight as can be seen from the smoke issuing from the top of the mound.

Fig. 6. A workman is regulating the rate of burning of a kiln with a long-handled shovel with which he positions the outer covering of soil and turf to check the ingress of air. Combustion in this kiln is well established and the mound of wood has started to settle causing the kiln to slowly collapse inwards.

Figs.7 and 8. Two workmen are dampening a kiln in which firing is complete. They use broad iron scrapers with very long handles to distance them from the heat and to provide access to the centre of the mound. At this stage of the process the charcoal must be allowed to cool down slowly whilst still being shrouded in soil and turf: any sudden exposure to a draught of wind would cause the charcoal to erupt into flame and render all the work useless.

Fig. 9. A workman cuts and prepares wood for charcoal burning: another figure can be seen similarly employed at the top right hand corner in Plate I.

Fig. 10. Carefully piled stacks of timber are illustrated which await to be converted into charcoal. The skill of the woodcutter is to cut lengths of timber and to arrange them conveniently for the charcoal burner. It is the responsibility and skill of the charcoal burner to sort the cut lengths of wood into sections of similar proportions when stacking them in the kiln.

Fig. 11. An extinguished kiln is illustrated in which combustion is complete, leaving the kiln collapsed in the form of a shallow mound. The final work of the charcoal burner is to remove the debris of soil and scorched turf to give access to the intact lengths and fragments of charcoal which must then be sorted and carted away for retail.
The reader's attention is drawn to the distinctive windbreaks arranged around each kiln. These are temporary constructions which protect the kilns from the prevailing wind: without their shelter the required slow-burning of the kilns would be jeopardized.

The lower part of the engraving consists of the following illustrations:

O Plan of a kiln of pyramidal shape fabricated according to the third method of construction. This illustration gives a good view of the central chimney or flue created from interlocking sticks.

P Plan of a kiln of conical shape also fabricated according to the third method of construction.

Q Perspective view of the kiln shown in plan form at O.

R Charcoal burner's line and peg with which the area of a conical mound is delineated as previously described and illustrated at A in Plate I.

S Wickerwork basket for collecting the charcoal.

Kitchen Gardens

There are five plates in this sequence which illustrate methods of laying out the planting beds in a kitchen garden; these also portray alternative constructions for heated greenhouses. Heated greenhouses (not illustrated in this article for lack of space) were used at the gardens of the Trianons and were remarkable for their technological refinement. One such was more than sixty metres long with an enclosure conceived on the scale of an orangerie; its façade contained more than 3,000 panes of glass. Furnaces and an extensive system of flues distributed heat to the plant beds and, in addition, massive thick walls to the rear of the structure served to absorb and retain heat which was then available to warm the plants by radiation. The engravings in this series of plates to the *Encyclopédie* are a vivid testimony to the resourcefulness of the Editors in identifying and recording eighteenth century state-of-the-art technological innovations with which to illustrate and exemplify a particular branch of human understanding.

Plate I

An outer wall is shown which serves as a windbreak and, together with the shelter belt of trees, affords climatic protection to the garden: an outer garden wall combined with an inner wall (see A) is also, somewhat unusually, provided.

A This is the primary kitchen-garden wall which would typically be some three-to-four metres in height, although truly majestic walls of six-metres height were built. Such walls were usually constructed of stone surmounted with curved decorative copings as illustrated. The garden shown has a formal entrance which would normally be provided with wrought-iron gates. The inner wall of a kitchen garden was often lined with brick to take advantage of the thermal properties associated with brickwork.

In the kitchen garden shown in the engraving, the wall has been banded vertically and horizontally with wire which supports espalier fruit shrubs and trees that are being trained to grow flat against the wall.

B Elevated beds of consolidated earth are angled to catch the beneficial rays of sunlight which help with the cultivation of young and tender plants that are being propagated under cloches.

C Elevated planting beds of more typical horizontal construction are shown: the walls of such beds, and those indicated at B, may be formed from blocks of peat.

D An example of a planting bed is illustrated which is sunk into the ground. Also shown at D is a planting bed laid out at ground level and partially covered with cloches.

E Standard beds for the cultivation of vegetables are portrayed. The illustration depicts several incidents typical of daily life in a kitchen garden: a gardener carries two watering cans of the kind illustrated at Fig.23 in Plate II; two labourers are hand weeding or planting; a third gardener

carries a rake or similar tool; and two children amuse themselves close by the main entrance.

F A fenced enclosure is provided to give additional protection from rabbits and other predators.

The middle part of the engraving is a plan view of a kitchen garden illustrating the layout of different types of planting bed.

G This area is reserved for the promotion of young fruit trees which are arranged in quincunx formation.

H An area is here set aside for young plants, fruit trees and shrubs which have been planted in an orderly chessboard pattern.

K Nursery for young trees and shrubs.

L An area for nurturing young cross-bred stock.

M Planting beds which, in addition to the protection offered by the high garden walls, receive additional shelter from screen walls: this provision is also given to the layouts shown at G, H, K, L, N, O and P.

N Three raised beds are shown which each support an array of cloches as depicted in the pictorial view.

O, P, Q, R, S, T, V, X and Y
This part of the engraving illustrates an orderly arrangement of planting beds for different varieties of vegetables. Note the care with which the two layouts are disposed about a practical arrangement of paths and are neatly bounded by a low perimeter box hedge.

The lower part of the engraving consists of the following illustrations:

Fig. 1. Bell-glass.

Fig. 2. Cloche woven from straw to serve as a cover to a glass cloche used to protect seedlings and small tender plants from excess heat and light.

Fig. 3. Cloche fabricated from glass panels and framed with copper or brass edging strips: such cloches as these were occasionally taken on botanical expeditions to distant parts to bring back choice specimens for cultivation.

Fig. 4. Plank with stakes to secure it to the ground to serve as an edge to planting beds whilst spreading compost, leaf mould or manure.

Viticulture and Wine Making

The equable climate of France, combined with her fertile soils and advantageous topography, have collectively favoured the cultivation of vines for the purpose of producing wine. The Roman occupation of France stimulated the introduction and acclimatization of various species of vines which were progressively introduced into such, now famous, wine-producing areas as Bordeaux, and the rich valleys of the Rhône, Saône, Yonne, Marne and Seine. Vineyards were further developed by religious communities who required wine for

ceremonial purposes, such as the dispensation of the sacrament, and for everyday use at the table. Today Hérault, a *département* of the south of France, created in 1790, has the greatest area of vineyards and is the single largest producer through the collective efforts of small holders working as organized co-operative associations of *vin ordinaire*. Other favoured regions have nurtured the development of extensive vineyards, or *vignobles*, which have made their locality world renowned for being wine producers *par excellence*. Of these, mention may be made of the Gironde (Bordelais), the Côte-d'Or (Burgundy), the Loire Valley (Anjou and Touraine), the Vosges (Alsace), the Île-de France (Reims), and Epernay.

In the *Encyclopédie* two plates are devoted to the cultivation of grapevines they are not illustrated here for discussion for lack of space. Instead I direct my attention to the companion subject of the processing of grapes in the wine press. There are four plates in the *Encyclopedie* (one double plate being counted as the equivalent of two singles) which illustrate the technical and constructional features of wine presses.

Plate II

This magnificent double plate portrays a perspective view of a double-coffer winepress of highly ingenious construction and method of operation.

Operation of the winepress

The press is unusual insofar as the action of the mechanism directs the force of the press laterally as opposed to the more typical action of a winepress in which the force is imposed vertically. The following is a brief description of the functioning of the winepress in which the parts of the press are identified with reference to their designating letter or number as appearing in Plate II.

One of the coffers or vats 14 of the press is first filled with grapes with the *mulet* q, or moving side of the press, retracted: assume this to be on the right-hand side as when viewing the engraving. The operator cranks the handle 7 in order to animate the system of gearwheels (the functioning of these is discussed in some detail later). As the primary gearwheel AB rotates, it advances very slowly left-to-right on a threaded axle (illustrated in detail in Plate III of the original engravings). This process advances the *mulet* with great force which progressively crushes the grapes. The grape juice trickles through the holes in the side of the press 14 and is duly collected in the large vat Q where partial filtration of the juice takes place. The juice is subsequently transferred, by a conduit pipe S and funnel T, to the large vat Y located in front of the press. Sediment is allowed to settle in this vat, after which the grape juice is distributed to the waiting barrels by application of air pressure to the vat Y induced by the action of a pair of bellows V. When full, the barrels are stored to allow the wine to ferment and mature. This part of the operation being complete, the winepress could be used in reverse as follows: With the primary gearwheel fully cranked to the right-hand side of the press, the coffer on the left-hand side would next be filled with grapes. The operator then cranks the mechanism in the *reverse* direction to crush the grapes as previously described. Meanwhile,

other workers pound the pulp residue in the right-hand coffer to extract any remaining grape juice; to accomplish this they use the heavy iron crushers shown in the engraving. When the pulp has finally yielded its grape juice, the coffers are cleared ready to start the process all over again.

By this ingenious process, the wine press could be employed continuously, traversing first to the right and then to the left, so as to make fullest use of its capabilities which would be essential at the height of the grape harvest with the need to process as many grapes as possible before the fruit started to deteriorate.

Other aspects of the functioning of the wine press are explained in the following description of the various parts of the mechanism.

Components of the wine press

Note: Letters shown below in brackets thus, ( ), may be missing in some editions of the *Encyclopédie*.

AB Primary or great gearwheel which rotates very slowly and thereby transmits huge force to the *mulets* q and in turn to the coffers of the press which are located on either side of its drive shaft.

(D)E Pinion or small gearwheel which shares the same shaft as the secondary gearwheel E.

E Secondary gearwheel of medium size.

FG Pinion or small gearwheel which shares the same shaft as the gearwheel G.

G Gearwheel which is rotated by means of the hand-driven crankshaft 7.

H(K) Pinion or small gearwheel which is powered by the crankhandle 7.

LL Large beams which support the wine press and help to keep it horizontal.

M Pad stones placed under the press to give it support and to raise it from the ground and thereby to protect the timbers from damp.

PP Wooden blocks to support the press.

Q One of two very large vats (see also R) which receive the wine juice directly from the press. Note the several strong bands of iron placed to secure the staves.

R Large vat as previously described under Q.

S, T Conduit pipe and funnel made of white metal or pewter which are used to decant the wine-stock to the great vat VY which stands in front of the press.

V Bellows by means of which air is pumped into the great vat VY thereby inducing the wine juice to flow into the conduit pipe YZ ready for collection in the barrels arranged below the stop taps.

VY Great vat in which all the wine juice from the press is collected.

YZ Conduit pipe used to transfer wine juice from the great vat to the supply pipe which feeds the barrels.

a, b, c, d, 1, 2, 3, 4, 5, 6
Barrels in which the wine is collected by means of funnels placed under the supply pipe. Each funnel has a stop tap to enable the supply of wine juice to be switched off when the barrel below is full. The barrels are subsequently stopped and rolled away for storage as shown in the engraving.

e Trestle-frame to support the supply pipe.

f Timber supports for the rails on which the barrels are placed.

g, h Rails to support the barrels. Note that the front rail is placed higher than that at the rear in order to tilt the barrels so as to evacuate all residual air by way of the bung holes.

k Bracing pieces to secure the corner plates of the winepress 13.

mm Beams to secure the corner posts 13.

p Blocks of wood to support the sides of the press 14 (see also u).

q Sides of the winepress which slowly move to the left and right so as to compress the grapes held in the coffers. The French term for these is *mulets* or mules, doubtless an implied reference to the considerable force they exert.

r Supports to the bracing pieces st.

s, t Bracing pieces in the form of large beams to secure the top of the press.

u Blocks of wood to secure the sides of the press (see also p).

r Supports to the bracing pieces s, t.

x Channels or gutters to collect the wine juice.

y Wooden sections from which the collecting trays of the press are made.

z Wedge-shaped beams which hold the wooden sections y in position.

1-6 Wine barrels (see above).

7 Crankhandle by means of which the wine press is operated.

8, 9 Principal timber columns about which the press is constructed. These columns support the essential parts of the press including the elaborate system of heavy wooden gearwheels; the two coffers on each side of the gearwheels; the sub-structure of the press; and the supporting beams for the roof of the press (not shown in the illustration).

10 Transverse beams which secure the columns (8 and 9) and give support to the main beams 12. Note the manner in which the ends of the beams have been decoratively carved.

12 Main beams. The massive size of these beams may be artistic licence or may indicate that they form part of a heavy roof structure which has been omitted from the engraving as being superfluous to a description of the essential workings of the press.

13 The lower part of the timber columns described under 8 and 9.

14 Sides of the winepress perforated with holes of about 25 mm diameter. These parts of the press would need to be constructed from immensely strong slabs of timber, such as oak, to resist being burst apart under the action of the press.

IX Examples of some of the tools associated with the vintner's trade which have the names and uses listed below.

I *Grapin*: A form of rake with which to clear the mass of compressed pulp from the coffers of the press.

II *Pelle*: A scraper with which to clean the sides of the press.

III *Pioche*: A hoe-like tool used to position the grapes in the press and to remove the pulp.

IV, V, X *Battes*: Mallets of heavy iron sections used for pulverizing the grapes.

Observations on the technical operation of the winepress

Close study of the mechanism shown in Plate III yields valuable information which enables a number of interesting conjectures to be made concerning the operation of the winepress. By way of illustration we commence with the technical arrangement of the system of gearwheels. Assume the number of teeth in each gearwheel and pinion to be as shown below:

Mechanism		*Number of Teeth*
Large gearwheel	AB	50
Pinion	D	8
Secondary gearwheel	E	50
Pinion	F	10
Gearwheel	G	30
Hand pinion	H	8

With this information, a good idea of the effort required to operate the press can be estimated as follows:

When the large gearwheel AB rotates once, its associated pinion D rotates (50 ÷ 8) = 6.25 revolutions. Therefore the attached secondary gearwheel E also rotates 6.25 times.

For each rotation of E, the pinion F turns (50 ÷ 10) = 5 revolutions. It follows that 6.25 revolutions of E rotate F (25 ÷ 4) x 5 = 31.25 times. Therefore the attached gearwheel G also rotates 31.25 times. For each rotation of G, the pinion H, and the attached crank handle 7, turn (30 ÷ 8) = 3.75 revolutions. Therefore 31.25 revolutions of G rotate H, (31.25 x 3.75) = 117.1875 times. In other words to turn the large gearwheel AB, the operator must turn the crank handle 7 a total of 117.1875 revolutions. We can extend our deduction further as follows:

Plate III (not illustrated) portrays a technical drawing of a worm gear by means of which the large gearwheel AB applies force to the *mulets*, or sides of the press, q. The worm gear has 15 threads each with a *pitch* of 10 cm. From this information, we can establish that one revolution of AB turns the worm gear once and thereby advances the press by 10 cm. It follows that to fully extend the press, the worm gear and AB must be rotated 15 times which requires the operator to turn the crank handle (15 x 117.1875) = 1,758 revolutions. Another way of expressing the effort involved in operating the wine press is to reflect that 1,758 rotations of the crank handle advance the press 1,500 mm (15 x 10 cm), i.e. for each single rotation of the crank handle the operator advances the press by a mere 1 mm.

We can give practical significance to the preceding calculations by converting them into everyday terms as follows: Suppose a strong man can turn the press when loaded with grapes at twelve revolutions per minute which reduces to a rate of six revolutions per minute as the grapes are progressively crushed and the load is increased thereby. This gives an average rate of work of eight revolutions per minute which suggests it would require (1,758 ÷ 8) minutes or two hours and forty minutes to operate a fully-loaded press. Given the need for the operator to rest at frequent intervals, or to allow time for another man to take his place, we can add, say, another twenty minutes to the calculation which gives a total time to crush all the grapes in the coffer of three hours exactly.

We can elaborate our calculation one further stage by considering the volumetric capacity of the wine press as follows:

The engraving suggests that each coffer of the press has a capacity of about two cubic metres. This is a considerable volume when converted into the equivalent number of panniers or baskets of grapes as used by the farm workers when harvesting the crop in the vineyards. We leave the reader to speculate how many baskets or panniers of grapes would be required to fill the press, which in turn invites reflection as to the rate at which the press would need to work in order to keep pace with the harvest being gathered in the vineyard.

Finally, as we take leave of this engraving, we can not but feel a deep sense of admiration for eighteenth-century French technology; for its impact upon rural agricultural life; and pre-eminently for the skill of the artist-illustrators who worked for the *Encyclopédie* by whose efforts this particular legacy of French agrarian culture has been so vividly preserved for our study and reflection.

Windmills

There are nine plates in this technically impressive sequence of engravings which illustrate both windmills and watermills designed for grinding wheat watermills are not discussed here for lack of space.

Plate I Pictorial illustration of a windmill.

The windmill is situated in appropriately exposed terrain where it can intercept the available wind. The miller takes his rest in the company of his dog and converses with a young woman who bears refreshments. The mill is constructed of a wooden superstructure mounted upon a circular masonry-base. Notice the ring of large stones around the windmill to which the structure is tethered. By means of a rudder-like beam, and with the aid of a powerful capstan, the orientation of the mill can be changed to catch the most favourable wind. S1 and S2 are the inclined planes of the roof, made from shingles, and S3 is the near-side of the mill cabin made from cedar-wood cladding.

Plate IV

This highly accomplished technical drawing shows the many component parts from which the windmill and its mechanisms are composed. The super structure, of massive timbers, is supported upon a masonry base the stone walls of which have great thickness to distribute both the weight of the edifice and the forces imposed by the wind. The following is a list of the names of the principal parts of the mechanisms and associated constructional and structural components which are identified by a letter or number which can be verified with reference to Plates I and IV.

A Principal horizontal beams upon which the super structure of the windmill rests.

B Giant connecting-spindle, approximately the diameter of a

ship's mast, about which the super structure rotates.

C Diagonal bracing members which transfer the forces at the centre of the structure to the principal horizontal beams (A).

D *Tail*: this large beam is secured to one of the stone posts placed around the windmill, as shown in Fig.1, which serves to hold the mill secure against the prevailing wind hence its great strength.

E Steps for climbing up and into the mill.

F Support to hold the steps above the ground to prevent damage when the mill is rotated.

G Gallery or upper floor level within the mill reached by a flight of steps (Fig 39). It is at this level that the grain is fed into the hopper (Fig. 72) and is milled between the grindstones (Fig. 66).

H Large geared-wheel which is rotated by the sails of the wind mill and which thereby provides the driving force that operates the various mechanisms. Note the manner in which rotation about an horizontal axis is transmitted by wooden gears to rotation about a vertical axis in order to turn the grind-stones.

K Side window to the upper floor level located to admit daylight to the area around the hopper and grindstones.

L, M Sails of the windmill.

N, O

a Small beam which gives support to the vertical shaft of the drive mechanism b.

b See a.

f Structural beam which supports the sloping part of the roof.

g, h, q Drive shaft and mechanism for hoisting the sacks of grain from ground level up into the gallery.

g Spool or reel, made in the form of a spoked frame, over which passes a continuous rope called the *vindenne*.

h End of drive shaft which is recessed into a beam.

Mk Iron strut from which a lever, which forms part of the operating mechanism, is supported.

m Hoist operating-lever to which a rope is attached.

np Rope which is used to control the hoist mechanism.

qr Rope used for hoisting sacks of grain into the mill.

s Beam which supports the drive shaft.

4 Wooden frame into which the connecting spindle is seated.

6 Large beams which support the super structure of the mill.

8 Floor joists.

9 Corner posts.

10 Supporting beam.

11 Vertical timber support.

20 Horizontal timber support.

22 Joists to gallery.

23 Purlin or edge beam which receives the diagonal bracing posts 24.

24 Bracing posts which are set at an angle to resist the diagonal forces on the wall of the super structure.

25 Vertical post or stud framing: note the corbelled bracket at the top which gives support to the large horizontal beam 46.

26 Centre cross-beam which carries the weight of the super-

structure and which in turn is supported by the connecting spindle B.

27 Small cross-beam, attached to the centre cross-beam (26), which supports the joists to the floor on which the grindstones are placed (see 36).

28 Post which provides support to the centre cross-beam at its mid-point.

33 Beam attached to a pulley used as a braking mechanism.

35 Pulley which serves the braking mechanism.

36 Joists which support the floor which houses the grindstones.

37 Chest below the grindstones in which the flour is collected and sieved.

39 Stairs up to the gallery where the milling takes place.

40 Tie-beam which gives rigidity to the frame of the super structure and which also supports the floor joists of the gallery.

41 Purlins or large horizontal beams (one on each side of the super- structure) which give primary support to the gallery and the millstone floor.

43 Corner posts to the gallery.

44 Secondary support-purlin or stud-frame section.

45 Purlin to the super structure at the gallery level.

46 Purlin which gives support to the upper frame of the super-structure and the mill roof.

47 Collar-beam to the front gable of the super structure to provide additional strength to resist the forces exerted by the sails.

48 Principal beam to the gable of the super structure which carries the forces imposed by the weight of the sails and the additional forces exerted by them when they rotate.

50 Plate bed in which is housed the collar of the rotating shaft (56).

51 Beam which provides support to the small collar at the tapered end of the rotating shaft.

52 Sole plate used to secure the small collar of the rotating shaft.

53 Beam which provides support to the buffer which checks the lateral thrust from the rotating shaft.

54 Buffer as described above (53).

55 Vertical framing post used to strengthen the gable of the super-structure.

56 Rotating shaft which supports the sails (note the large mortice which secures the sail beam) and to which is mounted the large gear-wheel.

65 Rim of the gear wheel which functions as a disc brake to regulate the rotation of the sails in excessively windy conditions.

66 Curved side-panels to the cylindrical container which houses the grindstones.

68 Part of the grindstone regulating-mechanism.

70 Iron tie-rod which forms part of the grindstone regulating-mechanism.

72 Grain feed hopper.

75 Principal inclined rafters to the gable end of the super structure.

76 Tie rafter.

77 Vertical posts which give support to the ridge beam 79.

78 Bracing piece.

79 Ridge.

80 Rafters to the roof of the super structure.

Artificial Ponds and Fountains

The hydrostatic engineering principles outlined in the plates in this series were widely adopted throughout France in the eighteenth century in numerous practical projects concerned with the supply and distribution of water and the application of water for enjoyment in pleasure gardens. Concerning the latter, the most notable of such enterprises are the truly breathtaking fountains and water displays created at Versailles.
To illustrate this part of the *Encyclopédie* I have selected illustrations and text concerning ornamental ponds.

Plate V

This engraving shows five designs for basins and reflecting pools.

Fig. 1. A simple rectangular design is shown surrounded by a boundary of ornamental trees.

Fig. 2. A circular basin is illustrated, the water within which is animated by a fountain. The design of the surrounding paths and the enclosure are based upon an octagonal figure which is further elaborated with semi-circular recesses that provide locations for marble sculptures depicting such subjects as nymphs and figures from antiquity. Locations for four benches are indicated at which to rest and enjoy the plashing of the water.

Fig. 3. A basin of elliptical design is illustrated contained within an octagonal enclosure that is bounded by walls and decorated with ornamental trees. On each extremity of the long axis of the pool are semi-circular recesses to house sculpture or to provide points of entry and exit for the supply of water to the pool which is necessary to prevent a display of water of this relatively static kind from becoming stagnant.

Fig. 4. This is the most ambitious of the designs illustrated being almost sixty metres long. The plan is based on an elongated rectangle with semi-circular ends and is sited at the point of intersection of two avenues which form a parade through the woods. Four long benches provide places to sit and enjoy the surroundings and the atmosphere created by the water and the associated landscape environment.

Fig. 5. The artist has linked this design with that shown in Fig. 2 by means of an inter-connecting path, both pools being located in a densely planted woodland setting. The layout is a reversal of that shown in Fig. 2: the geometry of the basin is an octagon and that of the enclosure is a circle. Four symmetrically disposed recesses provide sites for sculpture together with arrangements for benches.
The aquatic designs illustrated in Plate V form part of a landscape-design tradition which may be traced through the Renaissance to Italy, where designers introduced ornate sculptures into their conceptions. These were frequently sited amidst circular or polygonal basins, from which water spilled or jetted from fountains to other basins and ornamental containers located below.

Italian precedent and innovation established principles and ideas for both monumental civic fountains and ornamental garden fountains that found wide expression throughout northern and western Europe. In France one of the earliest examples of an ornamental fountain of note is the Fountain of the Innocents (1550), in Paris designed by Jean Goujon. A fine example of a niche-style water display is the Medici Fountain by Salomon de Brosse in the Luxembourg gardens, also in Paris.
The most technically spectacular and aesthetically sensational fountains and waterworks in France are the celebrated creations at Versailles, which form part of the landscape-garden complex designed by André le Notre. Here, ornamental basins and groups of statues are combined with large-scale concepts which include the Grand Canal, Pièce d'Eau des Suisses, Basin de Neptune and Bosquet des Bains d' Encelade. Secondary to these artistic achievements, but no less deserving of recognition, is the engineering feat of supplying vast quantities of water to animate the fountains and to supply the lakes, canals and basins, all of which is achieved through a maze of pipes, channels, waterways and aqueducts.

Landscape Design

There are seven plates in this sequence which illustrate the tools and equipment of the practical gardener together with ornamental designs for formal gardens and decorative flower beds. It is the latter aspect of this series which I illustrate here. To economise on space, four engravings have been combined here into a single illustration.

Plate III

A decorative flower bed is shown inserted into an extensive formal lawn flanked on each side with linear ornamental flower beds having scalloped edges and being planted at regular intervals with decorative trees or shrubs. The central design culminates in a figure mounted on a pedestal which is strategically located at the point of focus of three paths which radiate to the landscape beyond. Two large ornamental urns flank the sculpture and contribute their symmetry to the strictly formal composition.

Note: The reader is able to estimate the grand scale on which this design is conceived, and likewise those portrayed in the three accompanying plates in this series, from the scale which is included in the illustrations. The layouts are drawn to a scale of toise: this was an eighteenth-century unit of linear measure, one toise being the equivalent of 1.95 metres. It should also be noted that in some editions of the *Encyclopédie*, Plate III is incorrectly numbered in the preliminary *explications* as being Plate II.

Plate IV

This image shows two designs for ornamental flower beds based upon geometrical principles.

Fig. 1. The upper part of the engraving illustrates a formal planting layout of a symmetrical nature derived from a design for the

Tuileries Garden.

Fig. 2. The lower part of the engraving is of a design for the *Jardin de l'Infante*. The central ornate design is flanked by two avenues of ornamental trees and is surmounted by a formal circular pond which is located on the primary central axis of the composition.

Plate V

The illustration is of a design for a decorative formal lawn set within an extensive gravelled area intended for strolling. The composition is conceived to be located within a wood or park and is reached, with an intended element of pleasure associated with surprise, by one of four paths which are symmetrically disposed on the two principal axes of the composition. A large circular pond is provided with a fountain, the sound of which contributes to the pleasure of anticipation and discovery of such a garden when walking in the outlying parkland.

Plate VI

The illustration shows a highly ornate, geometrically conceived design for a garden. The composition is symmetrical and has a maze-like quality. Numerous paths provide opportunities for strolling amidst diverse flower beds which lead progressively to a central formal pond which is provided with a powerful fountain: the sound and moisture of the fountain would contribute considerably to the aesthetic experience of the garden especially on a warm day.

This section concludes my selection of plates and texts from the *Encyclopédie*.

Postscript

The *Encyclopedie* of Diderot and D'Alembert is an awsome achievement; it is little wonder that it required almost a quarter of a century to bring it to completion. As Ann-Marie Thornton my colleague and collaborator to our original researches remarks: 'The text of the *Encyclopédie* is vital and organic: it varies in quality, style, and method, at times using an impersonal approach and elsewhere adopting a more personal, informal tone offering kindly instructions and friendly recommendations as well as sterner injunctions.'
It is my hope that our publication in English, for the first time, of the articles on gardens, landscapes and related subjects will allow garden historians to form their own assessment of the *Encyclopédie*'s contribution to the dissemination of ideas on the theory and practice of gardening in eighteenth-century Europe.

I will now take leave of the reader with further words of Ann-Marie Thornton from the combined Preface to our original published work:

'Whatever the ultimate judgement made of the articles on gardens and landscapes in the *Encyclopédie*, it is clear that translating and presenting them has been something of a labour of love: the

essentially human dimension of the articles provided a source of endless delight, as we learnt that Duhamel's costly and conscientious experiments had been sabotaged by birds, encountered Dezallier d'Argenville instructing his readers not to talk whilst aligning their gardens, or found Diderot disputing experimental methods or even refusing to detail them until he had undertaken more convincing experiments of his own. This was an age in which the human mind sought a much fuller knowledge of the natural world, and we hope that the reader will derive as much pleasure and enjoyment as we have from a perusal of this exhilarating and little-known chapter in the history of humanity's cooperation with the land.'

NOTES

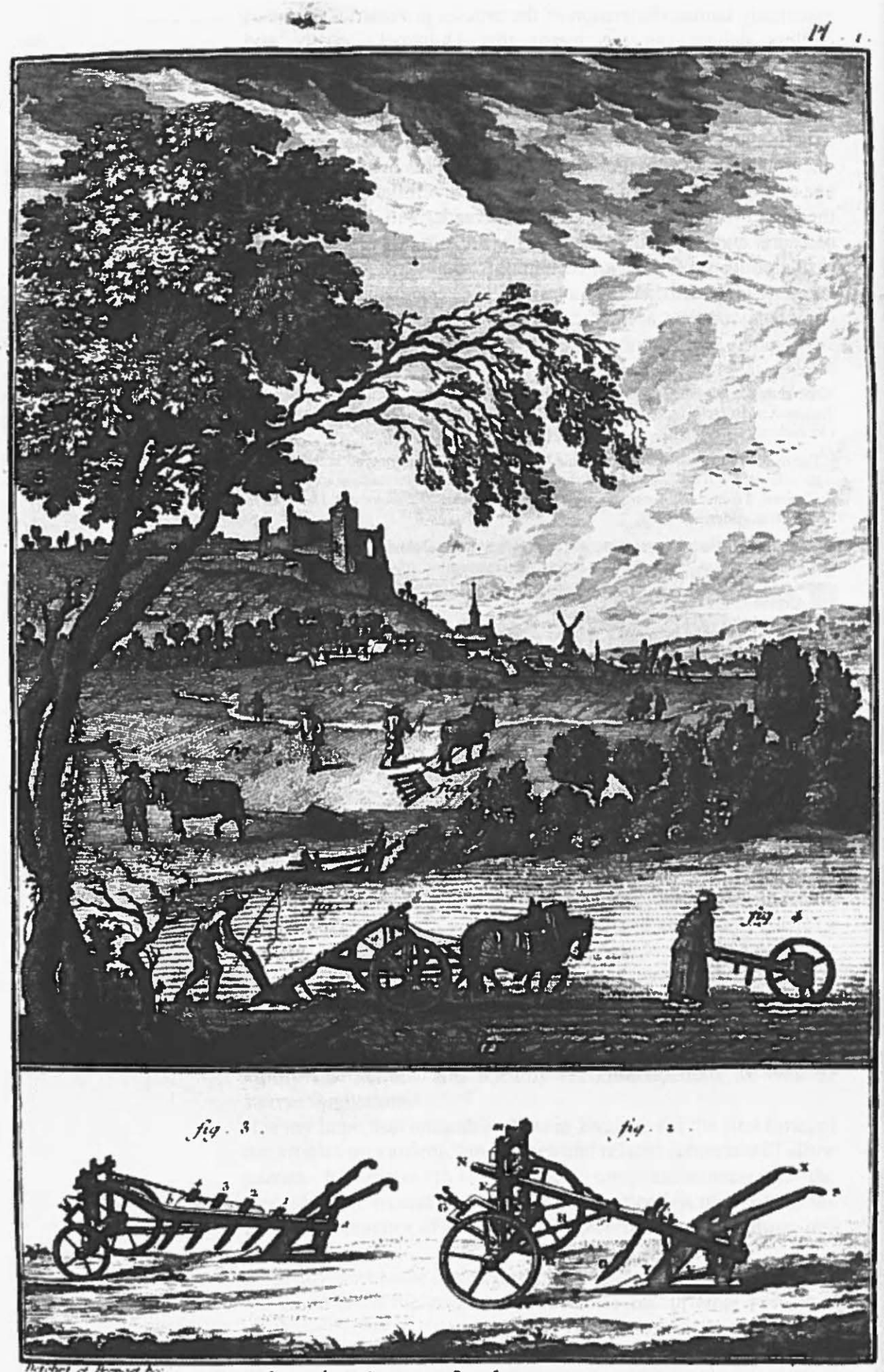
1 The gestation of the *Encyclopédie* and its metamorphosis from the *Cyclopedia* are discussed in: Russell, Terence M. *Ephraim Chambers: Cyclopedia*, Ashgate Publishing Ltd, Aldershot: 1997.

2 The manner in which architectural and related subjects are portrayed in the twenty-eight volume *Encyclopédie* and the turbulent circumstances of its creation are discussed in: Russell, Terence M, *Architecture in the Encyclopédie of Diderot and D'Alembert*, Scolar Press, Aldershot: 1993.

3 A discussion of the portrayal of the arts and crafts allied to architecture, as embodied in encyclopaedic works of reference before the publication of the *Encyclopédie*, is considered in Russell, Terence M, *John Harris: Lexicon Technicum*, Ashgate Publishing Ltd, Aldershot: 1997.

4 The work mentioned here was a collaboration with Mrs Ann-Marie Thornton of the Voltaire Foundation at the University of Oxford. The full bibliographical details of the book cited are as follows: Russell, Terence M and Thornton, Ann-Marie, Gardens *and Landscapes in the Encyclopédie of Diderot and D'Alembert: The Letterpress Articles and Selected Engravings*, Ashgate Publishing Ltd, Aldershot: 1999.

5 The illustrations in this article were reproduced, with permission, from the copy of the *Encyclopédie* in the Special Collections Department of the Main Library of the University of Edinburgh.



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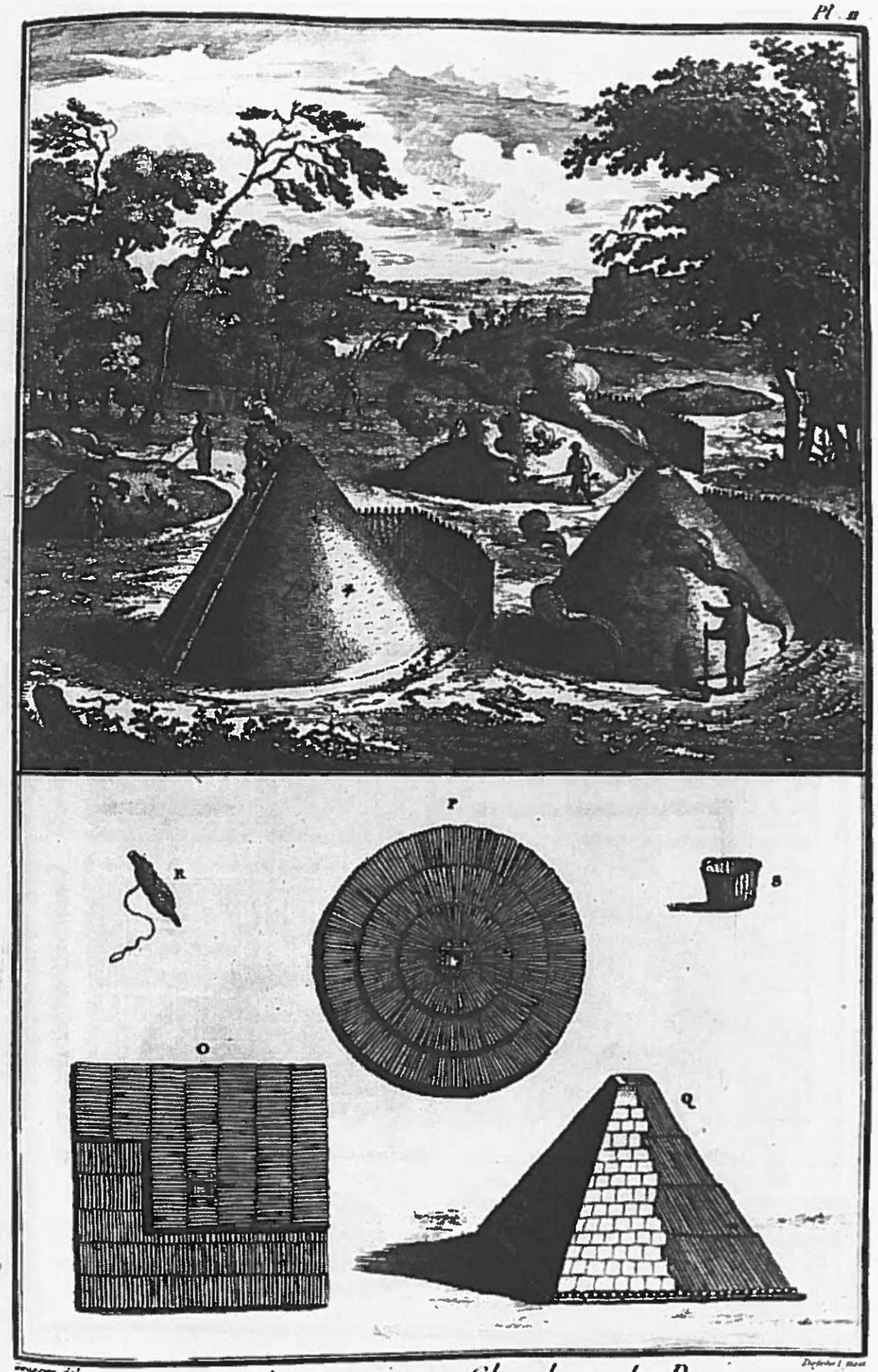
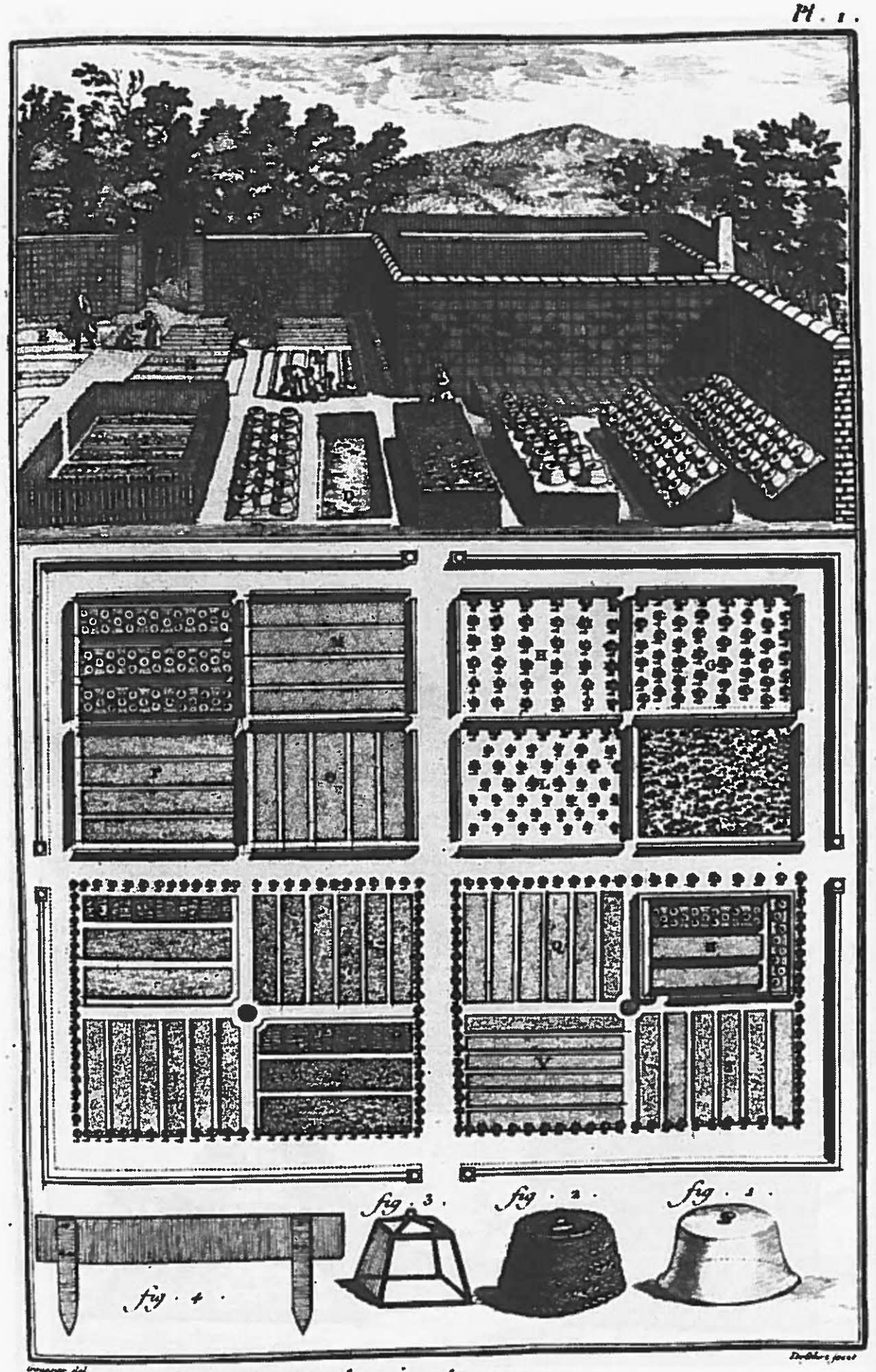
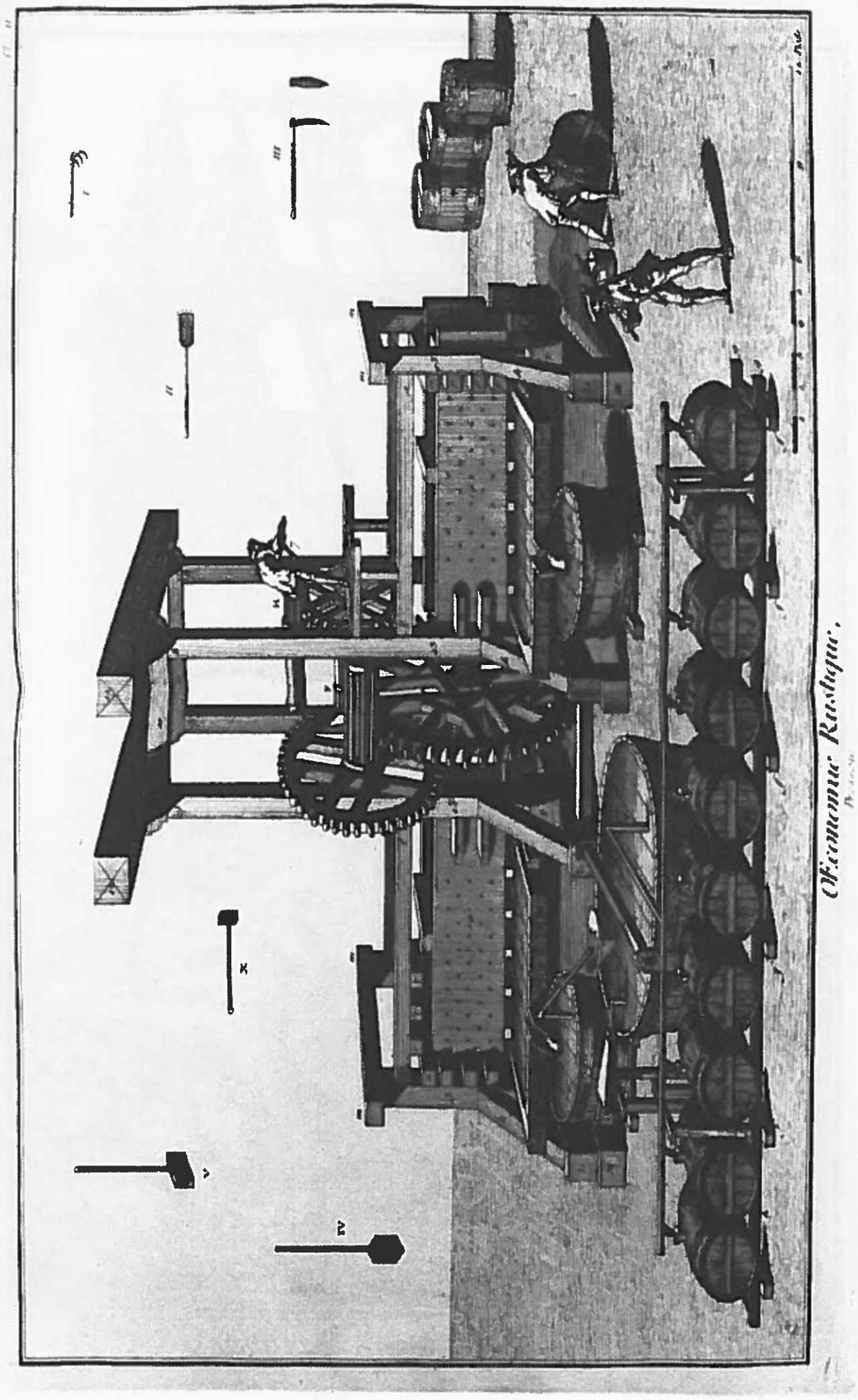


Economie Rustique, Charbon de Bois.



Agriculture,

Jardin Potager, Couches.



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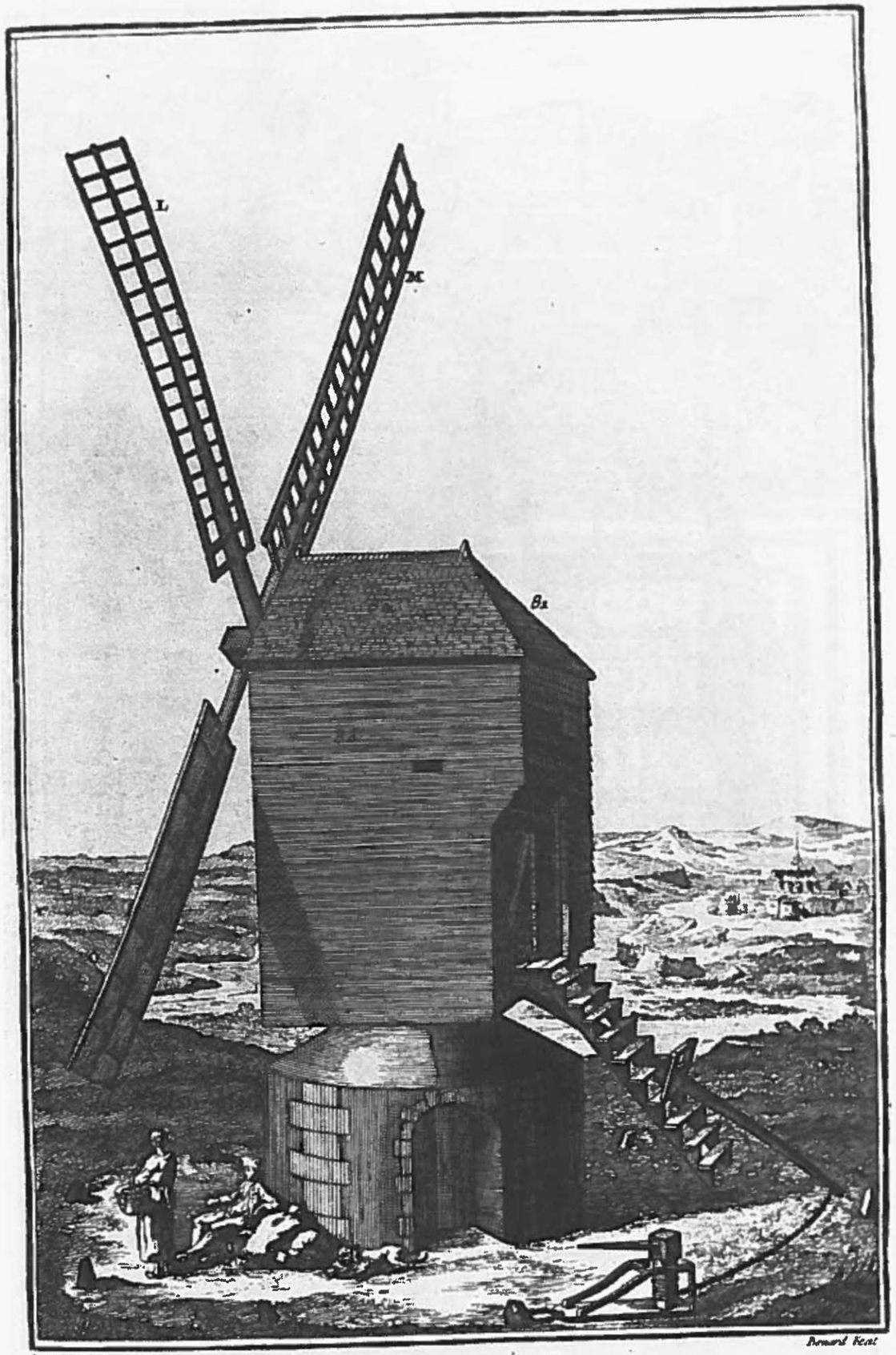
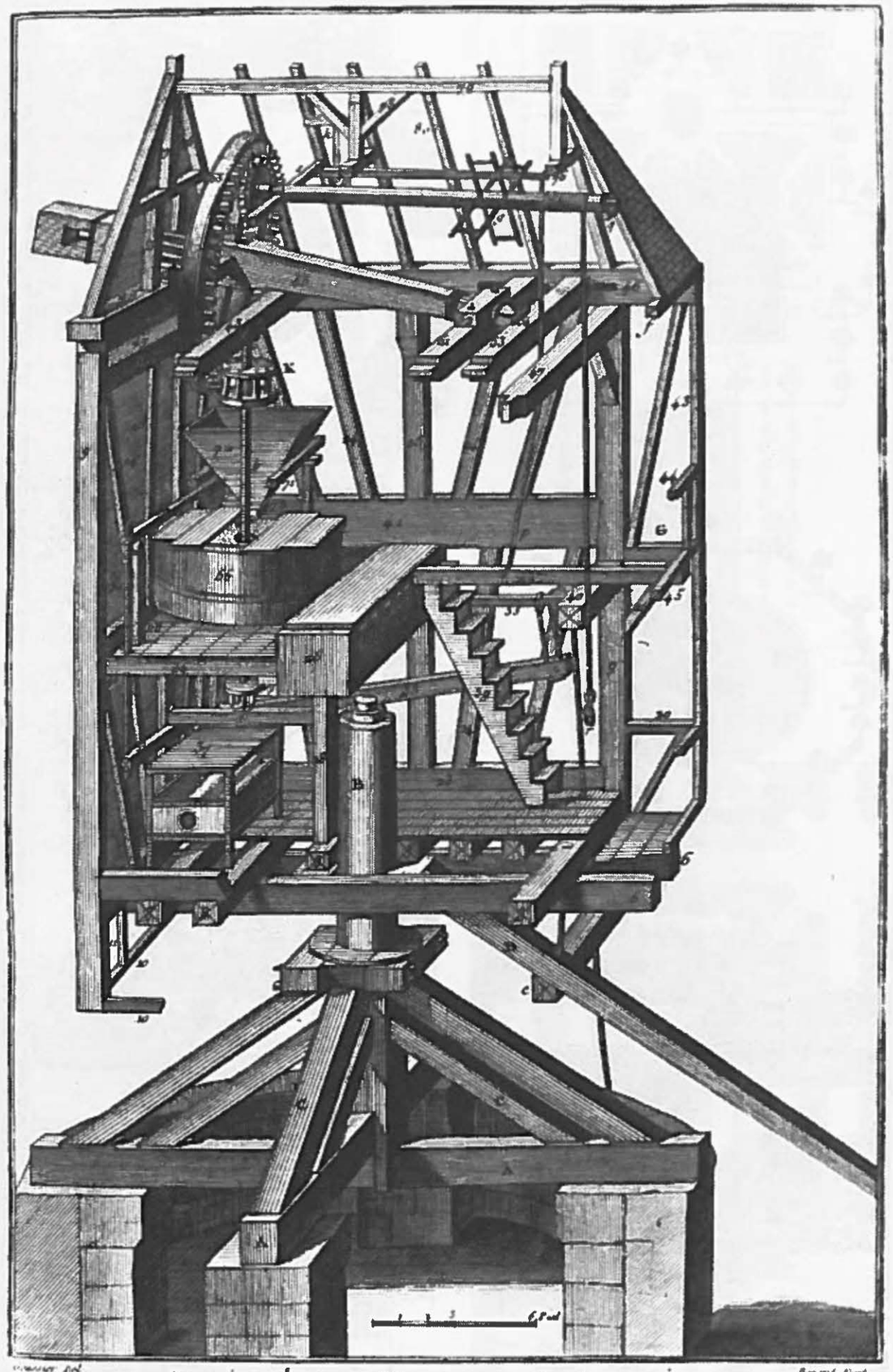


Agriculture, Economie Rustique.
Moulin à Vent

Garden and Landscape Subjects



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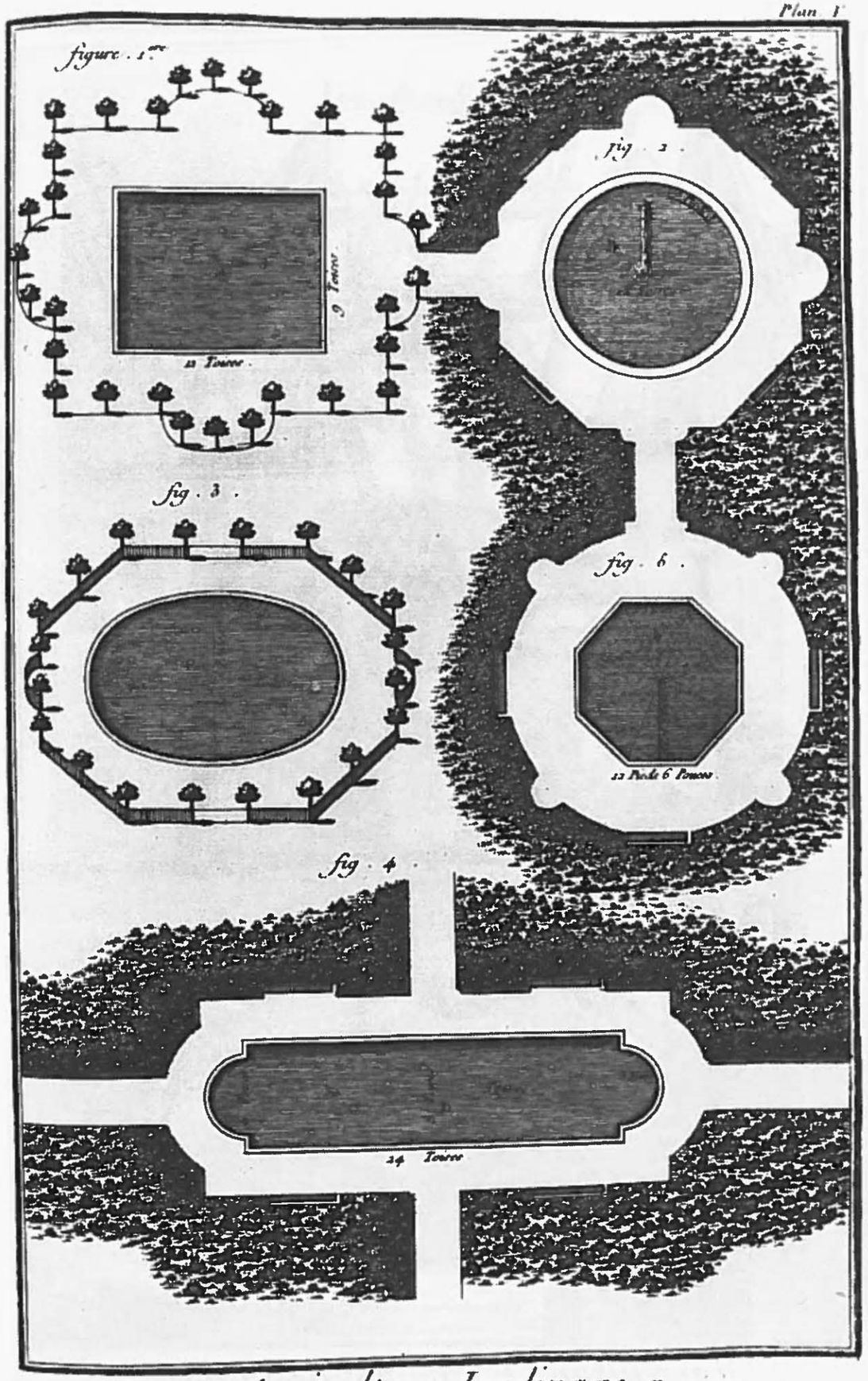
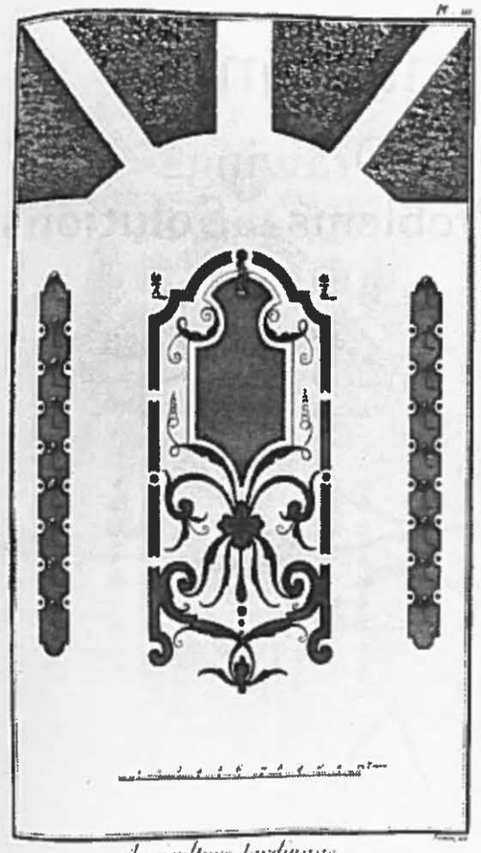
Moulin à Vent



Agriculture Jardinage . Fontainier



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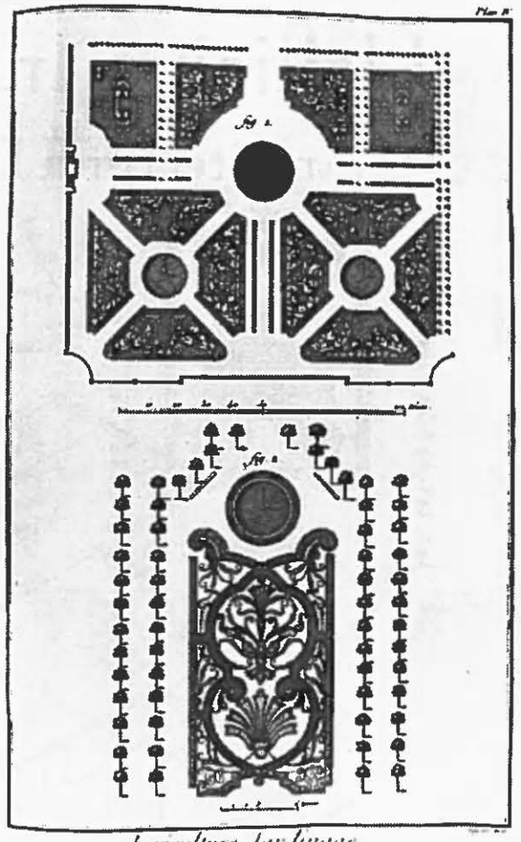

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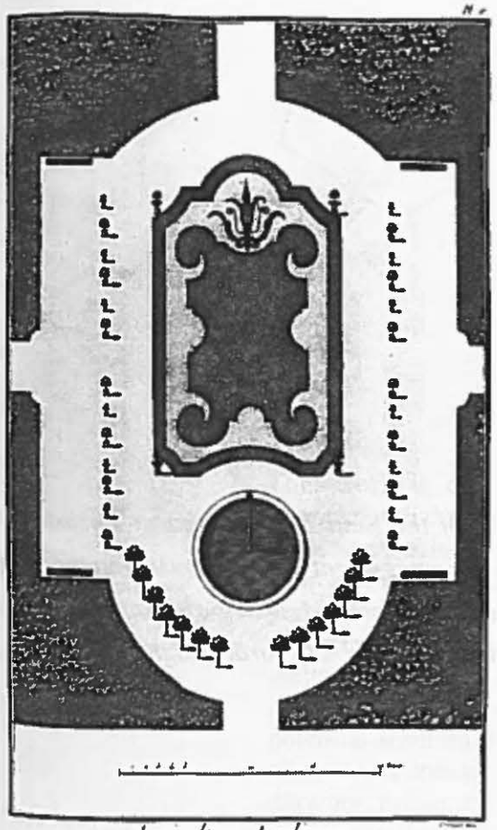

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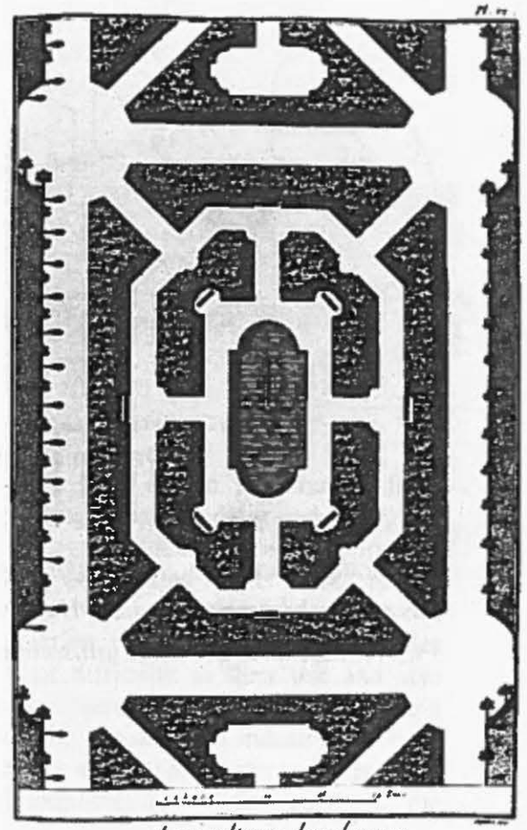

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