THE FORTRESS IN THE AGE OF VAUBAN AND FREDERICK THE GREAT 1660–1789

Christopher Duffy

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Christopher Duffy

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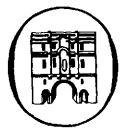
Siege Warfare Volume II



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Contents

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Illustrations

Vauban's France II

The siege of Bergen-op-Zoom 1747

The Elvas position

Dahlberg's Sweden

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Maps

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Preface

This book has two aims:

(a) to seek to explain how, in what is rightly accepted as the classic age of artillery fortification, military engineering came to be of less relative importance at the end of the period than at the beginning
(b) to integrate the study of fortress warfare with the military and general history of the time

Here I must set out my order of priorities. I assign little importance to the manifold paper 'systems' of fortification which were compiled in the seventeenth and eighteenth centuries by drawing-masters, clerical tutors, and chatty old retired engineers. If these schemes bulk so large in the compendia of Max Jähns and others, it is only because they are the kind of evidence which bookish people most readily understand.

I attach far more significance to works of fortification that have been actually carried out on the ground. The student of military engineering cannot rest until he has toured as many strongholds as it is physically possible for him to reach, and even then he must be aware of how much more has been done – and remains to be done – by those enthusiasts who are nowadays recording and preserving the fabric of artillery fortifications, and those newly minted historians who are working through the relevant archives.

I know from experience that it is more difficult to persuade people of the relevance of certain other perspectives. The problem relates directly to the present crisis of serious historical studies, which derives partly from an uncertainty as to what history ought to be about, and partly from the close-range defensive strength of modern scholarship which has encouraged a deplorable narrowing of interests and sympathies. Among fortress specialists themselves it is rare to find an individual who will be equally interested in the design of a stronghold, the symbolism of its architecture, the costs of construction, the character of the engineer who drew up the plans, the sieges which the place might have undergone, or the strategy which determined its location.

Lest it should be thought that I am pronouncing from a standpoint of superior wisdom, I must confess that it was only upon the last re-writing of the present work that I came to appreciate how rewarding it is to bring together the 'old-fashioned' history of events and ideas with what is termed with all too much accuracy 'immobile history' – the study of conditions and structures over a long period of time. It now seems clear to me that, for example, the difference in expertise between French and German engineers, or the success of Vauban and Coehoorn at their sieges, was directly related to the strength and continuity of support which these experts enjoyed from their masters. Hence the importance of the political dimension.

Again, the concept of military professionalism, as explored recently in the United States, proves most revealing when applied to engineers of the seventeenth and eighteenth centuries, who were evolving an institutional equivalent of those brother-

hoods of Italian masters who had transformed military architecture at the time of the Renaissance.

The theme of professionalism pulls together the stories of military engineering throughout Europe and the wider world. In the narrower European context it is as important – and as difficult – to avoid Francocentricity in studies of the time of Vauban as it is to eschew excessive Italocentricity when we look at the Renaissance. I have therefore responded to the call of Scandinavia, and Central and eastern Europe, defying all the talk of trolls, vampires or superstitious peasantry. My linguistic ambitions terminated some time ago, when I discovered that I was forgetting 'old' languages at the same rate as I was trying to acquire new ones. For voyages still further afield I have therefore not hesitated to rely on the tales of other travellers. It is no great crime to depend on third- or fourth-hand accounts when you are seeking not to compile a history which will be complete or authoritative, but merely one that will perhaps bring together things which have not been brought together before.

Two further comments are in order. In military engineering, questions of originality and attribution are very difficult to resolve without hard documentary proof from the archives. We shall never know with certainty where Vauban obtained the inspiration for his siege parallels. Again I suspect – though I cannot prove – that Montalembert copied the form of his famous caponnières directly from the Austrian Fort St Elisabeth on the Danube, but I am reluctant to lend any credence to authorities who are driven by national pride to claim precedence for caponnière-like devices which appear in medieval castles in Germany, Italy or Scotland. It is one thing to run a gallery from one work to the next, and knock some gun-ports in it, but quite another to set out, like Montalembert, to re-shape fortification on first principles. Intention and continuity must be our touchstones in such matters.

Finally, the demands of publishing economy dictate that most of the military operations and sieges in this volume can be treated only in summary fashion, to illustrate points of outstanding technical or strategic interest. The siege of Vienna in 1683, which is deliberately discussed at greater length, will have to stand in for all the other sieges on the eastern theatre. By the same token the struggle for Turin in 1706 will represent western baroque siegework at its most elaborate. The sacrifice of detail in the other episodes is all the more painful, since for a number of reasons the record of sieges is of far greater reliability than the evidence for combats in the open field: the process of siege and defence extended on occasion over a period of several months, and was not confined to a few hectic hours or minutes; the location of the contest may be determined with nearly absolute precision, and is often marked by fortifications which survive to the present day; lastly the direction of the operations lay largely in the hands of formally trained engineers and gunners who, if they survived, left meticulous journals of what had passed.

Directly and indirectly I owe a great deal to my associates in the Fortress Study Group, and in particular to Anthony Kemp, who has an unrivalled network of international correspondents, and who introduced me to the fascinating and little-known fortresses of central Germany. I am left with a debt which I cannot possibly repay to the scores of folk who gave freely of their time and expertise to assist me in my travels. Only a matter of weeks ago I was forced to revise my notions of French and Austrian engineering in the later eighteenth century, in the light of what I was told of Bohemian fortresses by Pavel Mertlík, of the Local Museum at Jaroměř in Czechoslovakia. It is merely from convention, and the lack of space, that the names of people like these do not appear on the title page. Now, more than ever, military history bears a collective character.

Secretariats of useful organisations:

Great Britain:
Fortress Study Group (journal *Fort*), 24 Walters Road, Rochester ME3 9JR.

The Netherlands:
Stichting Menno van Coehoorn (journal *Jaarboek*), Postbus 110, 5060 Oisterwijk, The Netherlands.

United States:
Council on America's Military Past, PO Box 1151, Fort Myer, Virginia 22211.

West Germany:

Deutsches Gesellschaft für Festungsforschung (journal *Zeitschrift für Festungsforschung*), Pelikanweg 38, 4230 Wesel, West Germany.

Supra-national:

Internationales Burgen-Institut (journal *Bulletin*), Chateau de Rosendael, 6891 Da Rozendaal (Gld.), The Netherlands.

There are two companion volumes to the present work:

Fire and Stone. The Science of Fortress Warfare 1660–1860, Newton Abbot, 1975. This book deals with the techniques of siting, designing, building, garrisoning, defending and attacking artillery fortifications in the classic age (out of print).

Siege Warfare. The Fortress in the Early Modern World 1494–1660, London, 1979. Similar in style to the present work, but contains additional sections on oriental engineering, and on urbanism and the architectural and literary symbolism of artillery fortification.

For the best general history of fortification please consult Quentin Hughes, *Military Architecture*, London, 1974.

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One Louis XIV and the Apogee of the Old Fortress Warfare 1660–1715

Allegro marziale 1660–78

The personal rule of Louis XIV

The classic age of artillery fortification takes its origins from late fifteenth-century Italy, the theatre of war which first experienced the full effect of two important advances in gunpowder artillery – the advent of truly mobile siege guns, and the employment of the dense and compact shot of iron, which slowly began to supplant the missiles of stone. Neither of these revolutions was as sudden or as complete as used to be thought by military historians. Over the following decades, however, gunners and engineers were impelled to re-shape fortification and siege warfare in ways that influenced the thinking of military technologists until the middle of the nineteenth century.

On the side of the attack, the Spanish were the first to evolve the 24-pounder cannon, the king of siegework, which represented the ideal combination of hitting-power, economy and mobility. In the matter of the defence, the Italian engineers presented Europe with the 'bastion system', which re-worked fortification in three important respects:

(a) Fortress walls crouched lower and lower until they became massive banks of earth, lined on their outer side by masonry retaining walls or (in the case of Dutch fortresses) by slopes of turf that were planted with stakes. The new ramparts gave enhanced protection against view and cannon shot, while providing the defenders with a wide and solid platform for their own artillery.

(b) Novel outworks endowed the bastioned fortress with the very desirable attribute of defence in depth. The most important of these defences were the 'ravelin' (a free-standing diamond-shaped fortification), and the 'covered way' (an infantry position running around the outer rim of the ditch).

(c) The overall plan assumed a characteristic star shape, and the lines of all the works were geometrically interrelated so as to bring a lethal cross-fire to bear along the ditches or over the ground outside the fortress.

There remained the very considerable problems of how best to employ these brilliant and various inspirations in the gross physical world. It was in fact an immensely time-consuming process to achieve a mastery of fortress warfare. You had to think in terms of decades or generations if you wished to form your construction engineers and gunners, assemble powerful siege trains, and win and consolidate coherent state frontiers. The thing was fundamentally a matter of politics rather than technology.

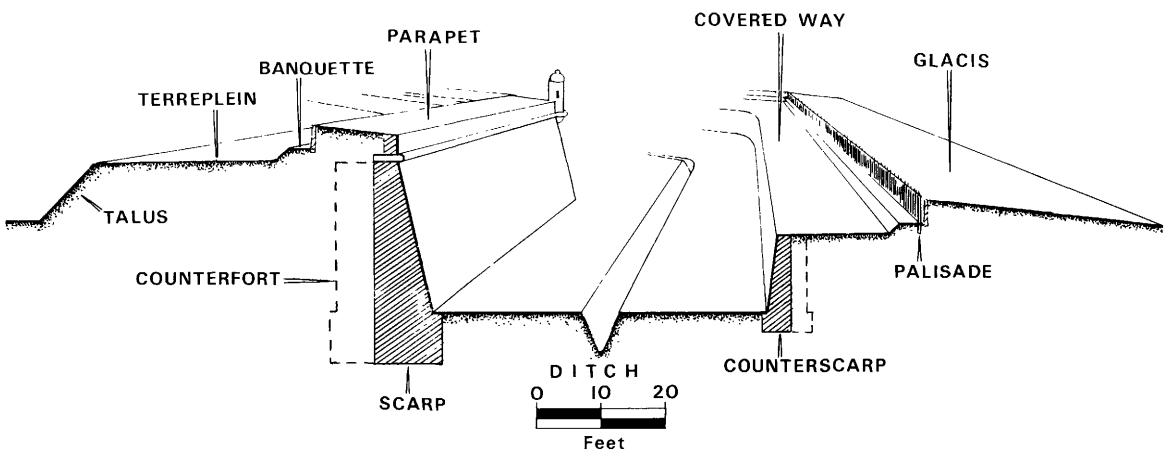
Only a recurring political instability held back France from claiming what we would now call 'superpower status' in the European context. That nation owned large physical resources, a united population which by the middle of the seventeenth century reached more than eighteen million, and a geographical position which enabled her to intervene with force in the Low Countries, in Germany and in the Mediterranean world. From about 1599 Henry II, the last of the Valois kings, showed what

could be achieved in the way of sieges and fortress-building by gifted men who enjoyed the support of royal authority. Henry was assassinated in 1610, and his legacy was lost in the period of religious strife and weak rule which supervened before the rise of another great Frenchman, Cardinal Richelieu, who rationalised the fortress system, and waged a series of lively if ultimately ruinous wars on the territory of his neighbours. Richelieu died in 1642, and within a few years the government became the prize of noble factions in the semi-comic Wars of the *Fronde*. However, Richelieu had begun the process of bureaucratisation in the armed services, and an element of continuity was provided by the nearly fifty-year rule (1643–91) of two successive *Sécretaires d'Etat de la Guerre* – Michel Le Tellier and his son the Marquis de Louvois.

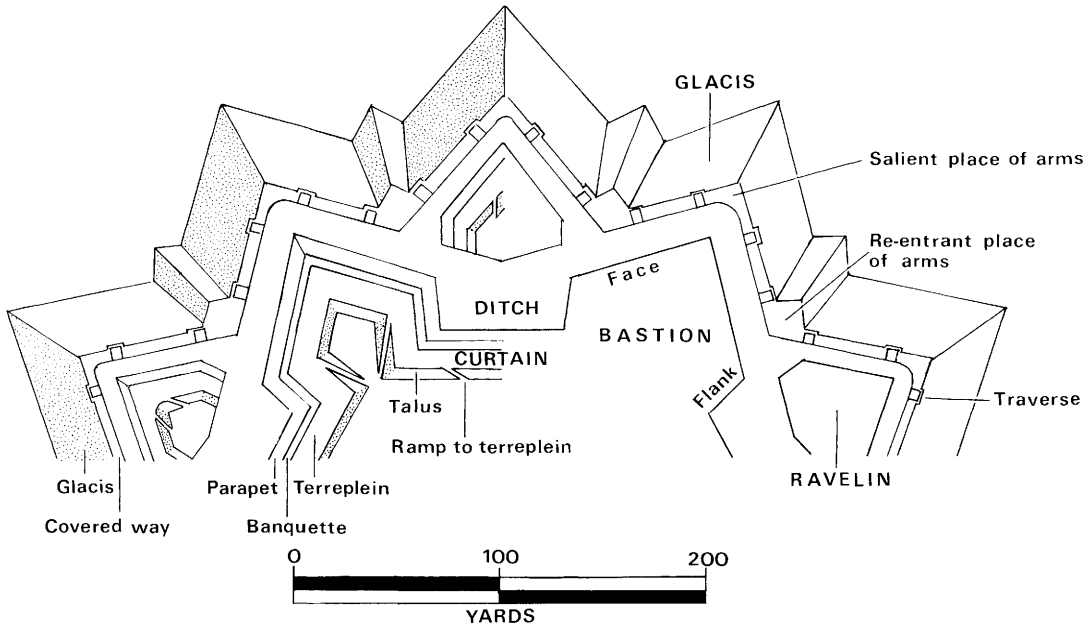
The advent of Louvois in 1661 followed closely upon the coming to full power of the young King Louis XIV, who terminated the era of civil unrest and, more importantly, proceeded to break the feudal world which had made such an aristocratic indulgence possible. Within three decades some of the other leading states of Europe had to re-shape their affairs to survive in competition with the novel phenomenon of this absolutist monarchical state, controlling a 'de-feudalised' army of unprecedented size and efficiency.

Some of the transformations in the French army were obvious to the eye – the bearing and address of the soldiers, which came from the loving attentions of the drillmasters, or the building of the stark and regular barrack blocks where the garrisons of the fortresses lived out their existence in peacetime. More far-reaching, however, were the decrees and practices which brought home to officers that they were servants of the state, and no longer semi-independent leaders of mercenary bands. The power of promotion was taken from their grasp by the *Ordre de Tableau* of 1675, which established the principle of advancement by seniority, except in cases of extraordinary merit. In operational matters

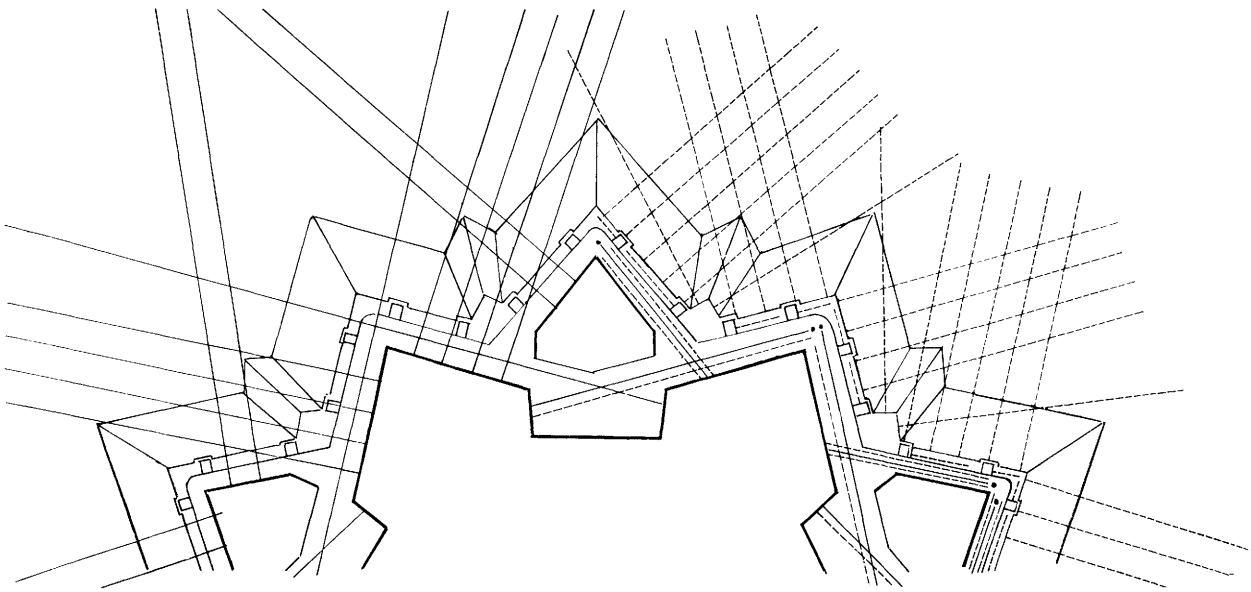
Essentials of the bastion system



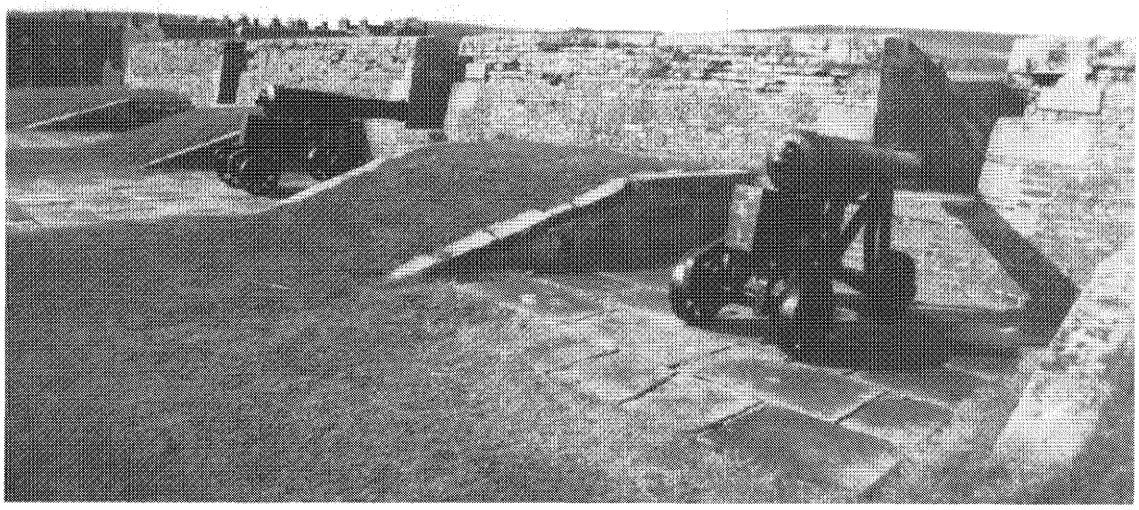
1 Profile of fortification. On the left is the great mass of the rampart. From the interior of the fortress an earthen slope (*talus*) rises to the wide *terreplein*, or fighting platform. An infantry firing step (*banquette*) lies immediately behind the cannon-proof *parapet*. The earthen mass of the rampart is retained on the outer side by a masonry *scarp* of brick or stone; this in turn is supported by *counterforts*, or interior buttresses, buried in the rampart. The far side of the wide ditch is marked by a corresponding *counterscarp*, or retaining wall. Beyond the counterscarp stretches the infantry position called the *covered way*, which has a banquette of its own, and a palisade set back a little way from the lip of the *glacis*, the clear, fire-swept zone which descends gradually to the open country



2 *Trace* (ground plan) of a simple bastioned front. Showing how the *enceinte*, or main perimeter, is indented to form the long straight walls of the *curtain*, and the angular projections called *bastions*. The diamond-shaped *ravelins* provide additional defence, and the zigzag line of the covered way is interrupted by breastworks (*traverses*), which intercept enemy cannon shot, and enable the infantry to dispute the covered way sector by sector. Infantry could concentrate in strength in the *places of arms* of the covered way, whether to repel attack, or to prepare for a sortie

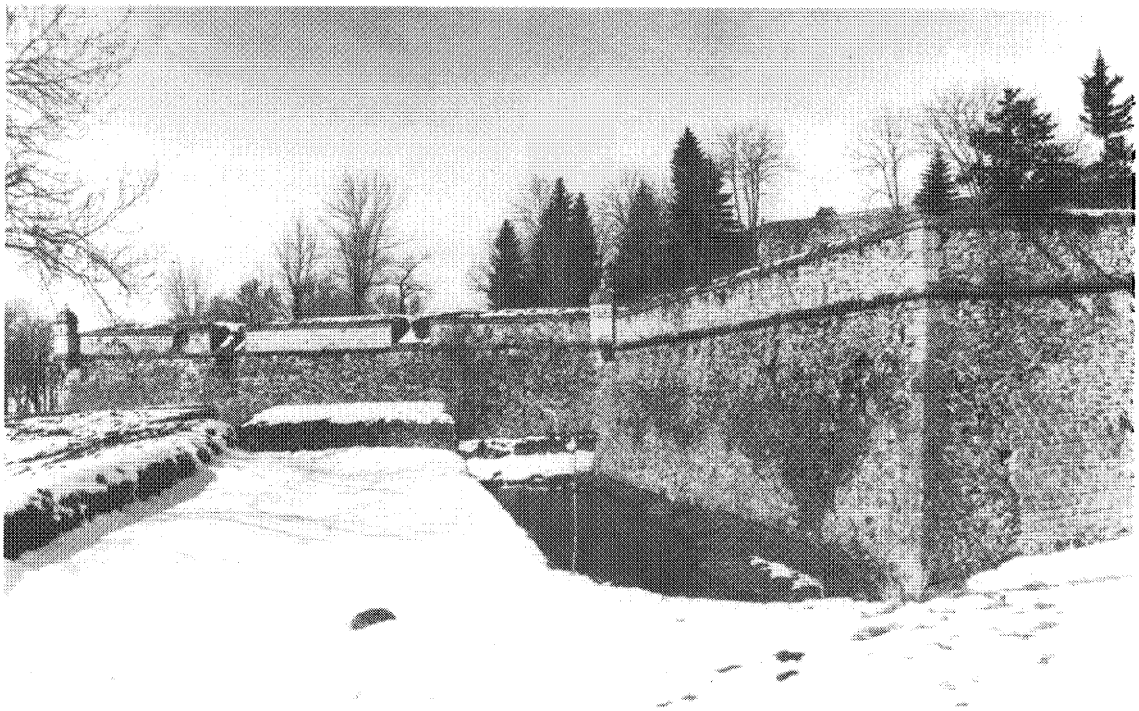


3 Intersecting lines of cannon fire (continuous lines) and musketry (dotted lines). The fortress-designer worked on the reasonable assumption that the gunners and musketeers fired more or less blindly to their front, and he aligned the works accordingly. The zone in front of the bastion was the least well covered by fire, which was why it was normally chosen as the point of attack



4 Gun battery (Fort George, Inverness). The banquette was cut away at intervals, to enable fortress cannon to be wheeled forward all the way to the parapet, and the barrels were pointed through outward-splaying slots called *embrasures*, cut through the thickness of the parapet

5 Ravelin (Montmédy Citadel)



6 View down a covered way to a snow-topped traverse (Mont-Louis). The covered way is commanded by a ravelin (right), and by the embrasures of the bastion face beyond

7 Covered way with multiple traverses (Montmédy Citadel). A small re-entrant place of arms is at the left centre

the establishment of march routes and chains of supply magazines made it possible to direct forces to where they were most needed, and not simply where the army commanders fancied they ought to go. In 1673 the two great men Turenne and Condé protested in vain against the *stratèges de chambre* of Louvois, who took on himself the higher management of the war against the Dutch.

The supporting services, the navy and the technical arms of gunnery and engineering began to realise their potential during this long period of stable and purposeful government, Ministers of proven loyalty and efficiency came to the fore, imbued with something of the confidence and ambition of *Le Grand Monarque* himself. Louis's right-hand man in military affairs remained the Marquis de Louvois, whose presence at sieges counted for almost as much as that of the king. Almost as significant was the work of Colbert, the minister of finances and of the navy, who by a strange dispensation saw to colonial and coastal fortresses, as well as works within the historic borders of France.

In their turn Louvois and Colbert gave full support to the most able military engineer of the time, Sébastien Le Prestre de Vauban. In 1675 Colbert wrote a typically blistering rebuke to an engineer who had ventured to criticise some of Vauban's designs:

> Get it into your head that it is not for the likes of you to tamper with Vauban's arrangements without express order. Before showing such presumption again, you should work and study another ten years under his direction. (To Niquet, 11 December 1675, Rochas d'Aiglun, 1910, II, 134)

King Louis put military engineering near the centre of his own interests. In 1650, as a young monarch, he had learnt the principles of the art from a fort that was built for him in the gardens of the Palais Royal. Now, as absolute ruler, he devoted many hours a week to reviewing projects of fortifications, and he kept himself up to date with all the developments of siegework. He was present at nineteen of the sieges directed by Vauban, and he liked in particular to be remembered for his activity at the attack on Maastricht in 1673:

> He seemed perfectly tireless in this operation. He issued excellent orders, and saw that every need was provided for. He was on horseback from dawn to dusk. He visited the trenches, regulated the attacks, and was present at all the assaults. Inspired by his example, the soldiers became heroes who were always ready to sacrifice themselves for his service. (Quincy, 1726, I, 353)

Out of all the operations of war, a grand siege was in fact Louis's favourite. Not only did it follow a predictably successful course (thanks to Vauban), but it provided a magnificent spectacle in the baroque style, at once vigorous and theatrical.

All of this bore significant implications for French military engineering. Vauban and his companions sharpened the edge of siegework through their technical advances. Moreover an 'absolute power, strongly centralised, became for them the driving force for a prodigious undertaking which transformed the physical aspect of their country' (Truttmann, 1976, 73). The new or newly rebuilt fortresses were usually capacious affairs, designed to accommodate the troops of the new standing army, as well as magazines and arsenals which sustained offensive operations, and Louis, Louvois and Vauban were careful to site these strongholds where they would serve coherent strategic ends. Here the central direction of state policy was of direct relevance.

The technical oeuvre is still impressive, even in these days of mechanised engineering. Work was going on at 160 or more places, embracing nine or so completely new fortress towns and a dozen new citadels. The enterprise at Longwy alone involved shifting 640,000 cubic metres of rock and earth, and raising 120,000 cubic metres of masonry, and this was far from the largest of the undertakings. Louis seemed almost indifferent to the cost, providing his engineers could run up a *belle place*, and Colbert caught the mood of the time perfectly when he wrote a letter concerning a fortress gate:

> We do not live in a reign which is content with little things. With due regard to proportion, it is impossible to imagine anything which can be too great. (*ibid.*, 38)

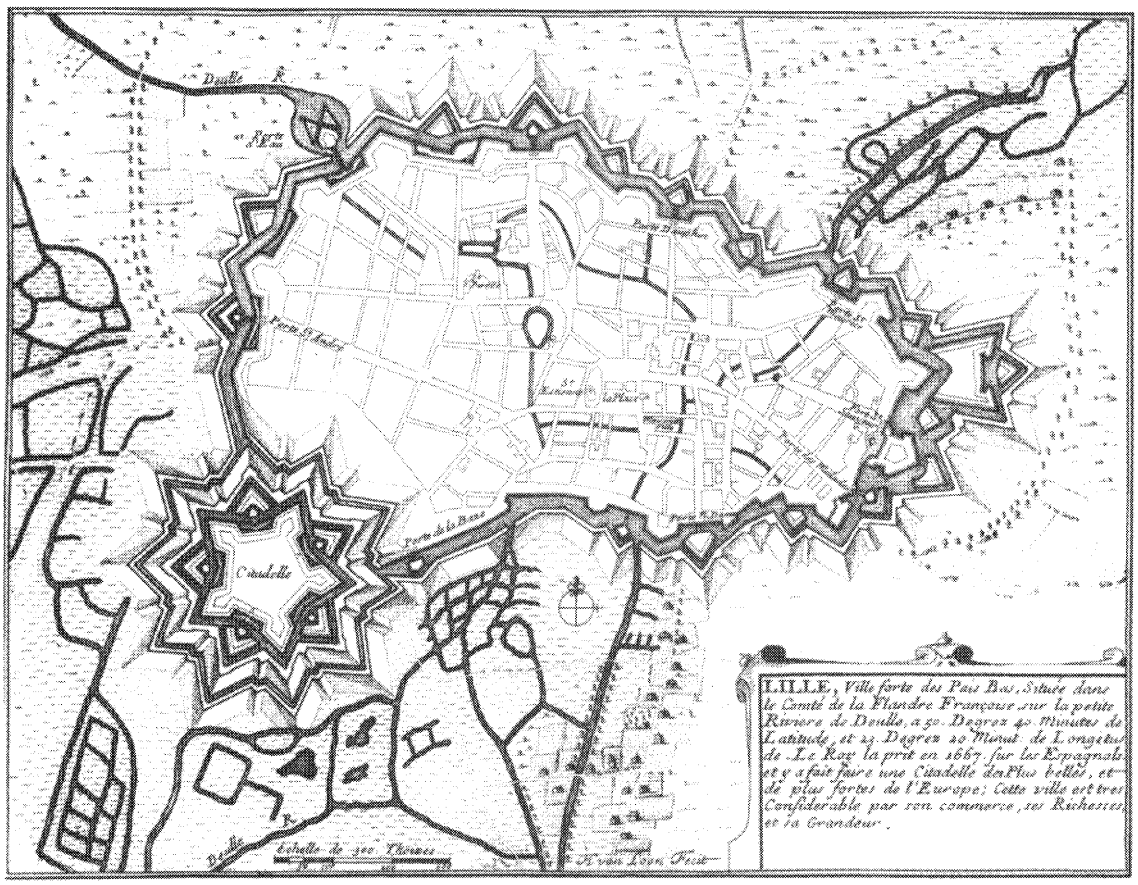
The war with Spain 1667–8

Surprisingly enough, France's first territorial gains in the new age were bought with gold, not blood. Duke Charles of Lorraine began the process by practically renting his duchy to the French forces. In 1662 his equally hard-up namesake, Charles II of Britain, was glad to sell the Cromwellian conquest of Dunkirk back to France. These accessions gave France some first-class military bases within easy reach of the Spanish territories of Franche-Comté and the Netherlands.

Spanish pride was not a commodity that was up for sale, but Louis calculated that the King of Spain (yet another Charles II) was such a mental and physical weakling that he would not put up much of a fight if France stole some territory in the Spanish Netherlands. Everything considered, it was difficult to think of two opponents less well matched than resurgent France and the ramshackle empire of the Spanish Habsburgs.

In the summer of 1667 the French swept over the border. While de Créqui kept the fortress of Luxembourg contained in the east, his colleague d'Aumont overran the coastlands, and the main army of 35,000 troops pressed into the heart of the country and took Charleroi, Ath, Douai and Oudenarde in rapid succession. The triple advance compelled the Spanish to divide their forces, and they were powerless to prevent the French from investing Lille, the capital of Spanish Flanders, on 28 August.

The direction of this important new siege was entrusted to Vauban, who had won Louis's confidence by his activity in the trenches before Douai. The Spanish rule was popular in Lille, and armed townspeople did everything they could to assist the garrison of 2,600 troops. However, the French guns



8 The new fortifications at Lille

opened up to devastating effect on 21 September, and within a week the besiegers had razed the parapets of the rampart and established their lodgments in the ravelins. On the 27th the Spanish capitulated for an evacuation.

Vauban thereby staked his claim to be the best person to re-fortify the great prize. He proposed to build a handsome citadel on the classic pentagonal plan, which would give ample space for all kinds of military establishments, and he carried the day against his nominal superior, the Chevalier de Clerville, who wanted a miserable affair of four bastions. Clerville pottered around planting surveying sticks at random, then departed the scene for good. By 1670 Vauban's fine new citadel was complete, and over the next two decades his work on the city walls extended the area of Lille by one-third.

As Spain still refused to come to terms, Louis turned his armies south-eastwards into Franche-Comté. The unprepared fortresses fell in the single month of February 1668 to the same combination of meticulous preparation and lightning movement which had delivered a great part of Flanders to the French in 1667. The English and Dutch began to make their displeasure known to Louis, and on 2 May 1668 the French deputies came to terms with the Spanish at Aix-la-Chapelle. Franche-Comté was restored to Spain, but the French retained their conquests in the Netherlands.

The worth of the newly captured fortresses (Lille, Courtrai, Oudenarde, Tournai, Douai, Ath and Charleroi) consisted in giving the French firm bases of aggression on the water avenues of the Lys, the Yser, the Scheldt, the Dender and the Sambre, and in affording Vauban the space to begin to build the *frontière de fer* – his famous double barrier for the northern borderlands. At the heart of the new territory was Lille, which had an importance of its own as the earliest, and perhaps the greatest of Louis's conquests, and as the fortress which Vauban came to regard as his *fille aînée dans la fortification.*

The Dutch campaign of 1672

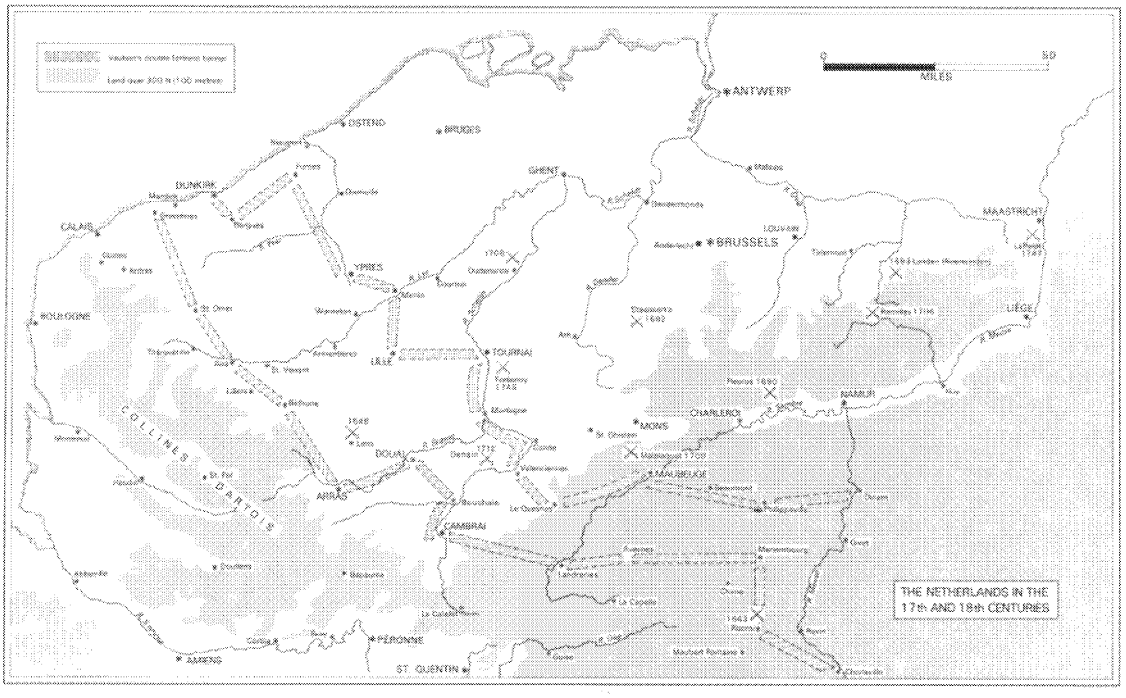
As the next step in extending his dominion to the north, Louis decided to leave the Spanish Netherlands to one side and strike a blow at the Dutch, who deserved to be punished for their lack of respect in the peace talks in 1668. He laid the diplomatic groundwork carefully, so as to leave the Dutch isolated, and he hoped that his offensive would be so rapid and so brilliant as to browbeat these people into allowing him a free hand in the Spanish Netherlands in the following years.

The examination of the consequent campaign of 1672 partakes less of the nature of a military analysis than of a pathological investigation of all the ills that are capable of infecting a fortress system. The Dutch were eventually saved by their water barriers, but the months that preceded this providential deliverance were marked by a collapse of defensive arrangements which finds no parallel until the Prussian débâcle of 1806.

Decay was most evident in the bricks-and-mortar (or rather sand-and-slime) aspect of the Dutch fortresses. As early as 1652 the Council of State, or central cabinet, had drawn attention to the 'urgent need of repairing the national fortifications' (Ten Raa *et al.*, 1911, etc., V, 517). As usual the province blithely ignored the warnings from The Hague, and in 1672 a French intelligence report on Doesburg could make a scornful reference to 'those old and ruinous earthen ramparts which, as you know, surround all the wretched little towns of this country, and which offers useful cover to any besieger who wishes to "attach" his miners to the foot of the defences' (Chamilly to Louvois, 1 April, Luxembourg, 1759, 41). Three years before the war the rich but parsimonious province of Holland actually suspended work on Naarden and all its other fortresses.

Everything to do with physical preparations for defence was in a bad state. Flood damage was left unrepaired, the Ijssel river barrier was allowed to silt up, and the magazines held horrors like the dried fish at Rees, which were found to be thirty years old and, as an official unnecessarily added, 'completely ruined and unfit for consumption' (Ten Raa *et al.*, 1911, etc., V, 517). There were few trained gunners to be had, and the guns themselves had been bought by the individual provinces from all over northern Europe.

Worst of all was the state of moral unpreparedness. A review of the garrisons of Dutch Brabant states that the recruits were 'drawn from every



The Netherlands in the seventeenth and eighteenth centuries

nation, and indisciplined and licentious. The French are the worst of the lot, for there are so many of them, and this number surely includes a good contingent of spies' (*ibid.*, V, 300). The townspeople disliked and despised their garrisons, and the morale of the Dutch forces as a whole had scarcely recovered from the reverses inflicted upon them by the army of the Bishop of Münster in 1665. Since then many of the troops had been on watch winter and summer against a new irruption from Münster, 'a labour which is by no means agreeable to the Dutch national character' (Chamilly to Louvois, 2 February 1672, Luxembourg, 1759, 15).

In so far as the Dutch had a plan of defence, it turned on holding Maastricht, the fortress which seemed to be the most endangered by the new French foothold on the Sambre at Charleroi. Instead, Louis and Louvois decided to leave the place isolated harmlessly to the west, and bring the army of 110,000 men on a right-flanking circuit along the Rhine and the lower Meuse to the interesting area of Gelderland where the Rhine divided into the Waal, the Neder-Rijn and the Ijssel.

In June 1672 the strategy was put into effect, and the first results were spectacular. The strongholds of Arnhem, the Schenckenschans and Zutphen succumbed most abjectly, and only Nijmegen offered a creditable defence. As a last resort the Dutch summoned the elements to their aid. They had just enough time to open the sluices at Muiden, which permitted the waters of the Zuider Zee to fill the inundation of the *Oude Hollandse Waterlinie*, which ran southwards from Muiden behind the unoccupied towns of Naarden, Woerden and Oudewater to the Neder-Rijn (Lek). The heartland province of Holland was now sealed off by a glittering barrier, and ingloriously but unarguably the Dutch had brought Louis's runaway progress to an end.

The continuation of the war in the Netherlands 1673–8

Like his father in 1635, Louis XIV was drawn by the prospect of a rapid and decisive local victory into a prolonged war of European dimensions. The Dutch refused to be brought to terms, and their appeals for support met with a response from Spain

and the Emperor of Germany. King Louis was not at first particularly worried, and in 1673 he decided to address himself to some unfinished business from the last campaign, and eliminate the Dutch garrison in Maastricht. Once in French hands, Maastricht could be easily supported from friendly territory, and its position on the middle Meuse would facilitate communications with the French armies now operating in Germany.

Thirty-five thousand troops converged on Maastricht on 6 June 1673 and laid the place under close investment. Everything seemed to indicate a long resistance, for the town was held by a garrison of 6,000 men under Major-General Jacques de Fariaux, 'a brave man with a good record' (Saint-Hilaire, 1903–4, I, 118). Twenty thousand peasant labourers duly opened the trenches against the Tongres Gate on the night of 17–18 June. This, however, was no ordinary siege, for Vauban was in charge of the operation, and in an access of inspiration he brought about the greatest advance in the siege attack since mobile siege artillery was introduced in the 1490s. Louis wrote that:

> the way in which we conducted the trenches prevented the defenders from doing anything against us, for we advanced towards the fortress in broad and spacious trench lines, almost as if we were drawn up for a field battle. The lines were furnished with firing steps, so that we were able to meet the enemy on a very wide frontage. Neither the governor nor his officers had ever seen anything comparable, even though Fariaux was a veteran of five or six sieges – he was used to dealing with narrow approach trenches which were untenable against the smallest sortie. (Louis XIV, 1806, III, 549)

The progress of these novel trenches was greatly facilitated by the fact that they were directed by 'a single commander [Vauban], who received his orders directly from the king and reported to His Majesty alone' (quoted in Lazard, 1934, 156–7).

Parallel gave way to zigzag saps, zigzags to a further parallel, and so on until the French were close enough to take the hornwork and ravelin of the Tongres Gate by battering and assault. Fariaux capitulated on 1 July, in return for an evacuation

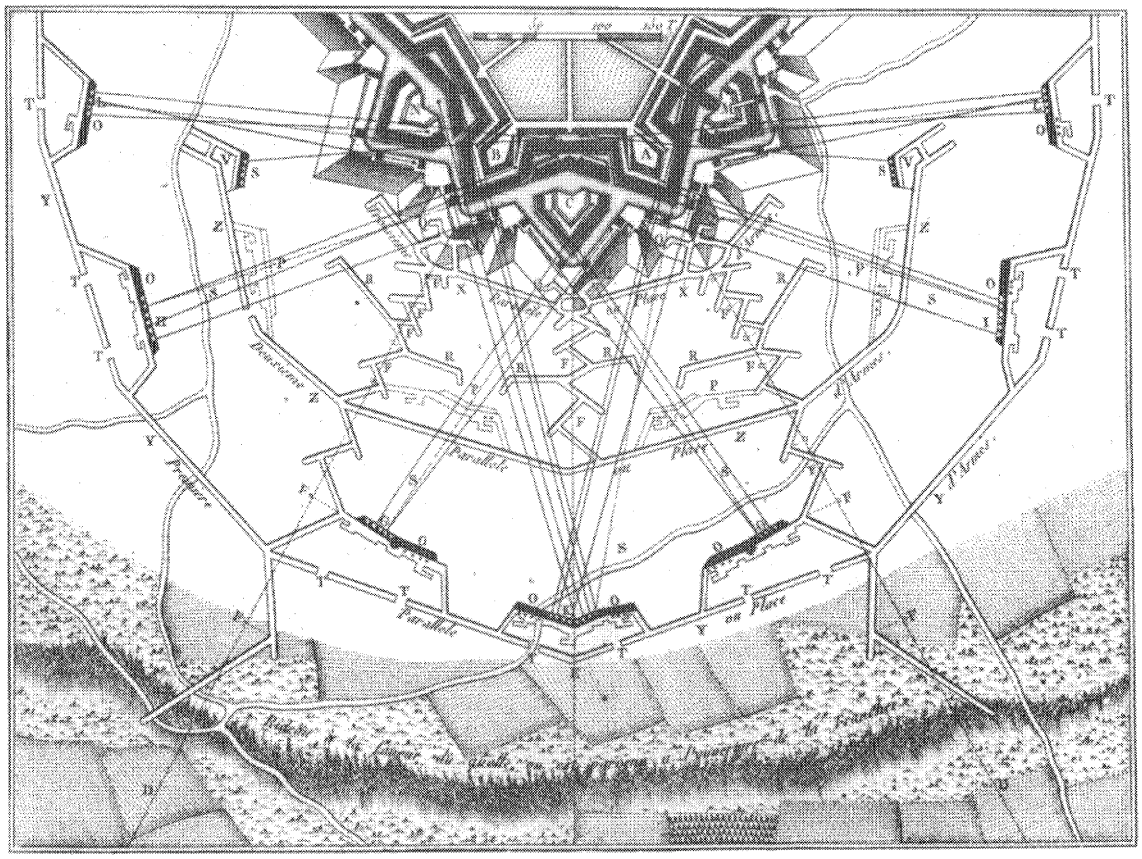
9 Louis XIV at the sieges

for the 3,000 survivors of his garrison.

The siege parallel was the culmination of a striving which had been expressed in devices such as Montluc's *arrière coins* of 1558 (see *Siege Warfare*, 1979, p. 54), the siege redoubts of the Netherlands wars (*ibid.*, p. 93), and the transverse trenches of some unsung French engineers of the earlier part of the seventeenth century.

The siege parallels had the simplicity of genius, and they fulfilled a variety of functions with extraordinary ease. The first of the parallels was dug just out of effective cannon shot. It replaced the old countervallation entirely or in part, and acted as the foundation for the whole of the rest of the siege. As further parallels were dug closer to the fortress, so they offered the besiegers secure sites for their batteries, a defence against sorties, and start lines and supports for assaults. In other words, Vauban assailed the fortress with a marching fortress of his own, and stole for the siege attack the tactical advantages which had hitherto been the preserve of the defence.

Not just the siege tactics of the French, but their entire way of making war seemed machine-like and



10 Vauban's trench attack, with zigzag approaches and three parallels

irresistible. While the Prince of Orange spent the early spring of each year in extracting money from the Dutch provinces, and prodding the decaying Spanish forces into a semblance of life, Louis was able to proceed without hindrance to attain whatever objectives he had set himself for that campaign. The Dutch Council of State observed that:

the French habitually made considerable progress in the Spanish Netherlands in the winter and early spring, before we could subsist in the open field. This advantage is not just a question of superior forces, but proceeds from the practice of making magazines on the borders, from which they may support their troops at a time of year which would otherwise be unsuitable for military operations. On our side, in that season, the forces are scattered in garrisons, and we lack the fodder to enable them to be concentrated. (Ten Raa *et al.*, 1911, etc., VII, 41)

After a couple of successful sieges, the French liked to maintain a restful equilibrium in the Netherlands for the rest of the year. This they did by holding the army in strong positions, and juggling with the useful intermediate corps which they held in the region of the Moselle and the upper Meuse. As the Earl of Orrery explained:

the French with great prudence attack places in the beginning of the spring, when there is no army to relieve them; and in the summer, when the whole confederacy is in the field, they are on the defensive, and cover what they have took; and in my weak judgment, they do at least as much by their always providing well to eat, and by their

entrenched encampings, as by their good fighting. (Orrery, 1677, 139)

The French rarely had to take to the open field in these final months of the campaigning season, for the allies were gratifyingly incompetent at the business of fortress warfare, as was proved when they laid siege to Oudenarde and Grave (1674), Maastricht (1676) and Charleroi (1677).

These conditions made it possible for Vauban to shape campaigns in accordance with ultimate strategic objectives. The sieges of 1675 (Dinant, Huy and Limburg) gave the French a continuous line of Meuse fortresses as far down as Maastricht, except for a single enemy foothold at Namur. All the same, the sight of the jagged French border was still displeasing to Vauban, and in particular he was dissatisfied at the fashion with which the provisions of the last peace had given the French a wedge of fortresses (Lille, Armentières, Courtrai, Oudenarde, Ath and Tournai) which jutted into the midst of Spanish territory as an awkward salient, with enemy fortresses poised dangerously on the flank and rear. On 21 September 1675 he accordingly wrote to Louvois that the king should think seriously about creating a *pré carré* – an untranslatable expression which carries the general meaning of 'defensible frontier zone'. On 4 October he went on to suggest that the French ought to begin to even out their frontier by eliminating the Spanish fortresses to the right (east) of the Lille salient, for he saw that the places of Condé, Bouchain, Valenciennes and Cambrai had excellent intercommunication along the Scheldt, and that once they were in French hands they would form a bastion from which Louis could not be evicted in a score of years.

In 1676 the French began to put Vauban's programme into effect, reducing Condé, Bouchain and Aire. The States General rightly attributed the misfortunes of the last two years to the fact that on their side 'affairs were not regulated as speedily as was called for by the needy state of the alliance and the might of the enemy' (Ten Raa *et al.*, 1911, etc., VI, 61). However, the performance of the allies was not a whit better in the next year, when the French were allowed to expand their conquests to the east of Lille. As if to demonstrate his versatility in all branches of fortress warfare, Vauban took Valenciennes by a decidedly unconventional daylight assault on 17 March, then reduced Cambrai for formal siege in the following month.

Away on the coastal flank Saint-Omer fell to a French detachment on 19 April. This was a clear sign that Louis intended to build up his *pré carré* to the west, as well as to the east of the Lille salient. Indeed, Saint-Omer by itself was such a useful prize that the French could afford to suspend all work on their rearward fortresses in Picardy.

The campaign of 1678 followed the clearly established routine. The Prince of Orange could not begin to move to help the threatened fortresses, and he had to look on impotently while Louis wrested Ghent from the Spanish on 11 March, and went on to reduce the marsh-fortress of Ypres on the 25th. The French then assumed their usual smug and unassailable defensive posture in the Netherlands for the rest of the campaigning season.

Rather than go through the whole painful process yet another time, the allies came to terms with the French at Nijmegen in August and September 1678. The Dutch regained Maastricht, but the Spaniards had to sacrifice the patently untenable Franche-Comté, and give the French a solid and continuous *pré carré* in the Netherlands by yielding a wide constellation of fortresses which stretched from Maubeuge on the Sambre to within sound of the Channel waves at Furnes (Valenciennes, Cambrai, Bouchain, Condé, Menin, Ypres and Saint-Omer). The return of Charleroi was the one concession they were able to wring from the French. Altogether, Louis had gained almost everything he wanted on his northern frontiers. His ambitions were now to be channeled towards the east.

For the Dutch, the first priority was to mend or replace the fortresses which had let them down so badly in 1672. Bergen-op-Zoom, s'Hertogenbosch and Kampen were considerably strengthened, and Naarden, Grave, Breda and Sas van Gent were completely rebuilt. The old Dutch school of fortification was dead and discredited, and Menno van Coehoorn, the creator of a 'new' Dutch school, was still known only as an officer of infantry who had a strong interest in engineering and gunnery. In the absence of native masters the Raad van Staate and the Stad-

houder William III therefore turned to French models, as brought to them by Paul Storff de Belleville. Unusually far-travelled, even by the standards of military adventurers, Belleville had served Swedish, Venetian, Spanish and Palatine masters before joining the French in the late war (on a commission from Charles II of England) and acting, as he claimed, as chief engineer under Vauban in the Low Country sieges. Belleville came to Holland in 1678, and he designed and directed the early stages of the construction of the works at Grave (1680–9), and probably also at Naarden (1678–85), Breda and Sas van Gent. He bade a hasty farewell to the Dutch at the end of 1683 or early in 1684, following the subsidence of the new bastions at Grave, and he returned to the service of Venice, commending himself as the creator of those last four places, 'which are reckoned at present to be the strongest fortresses in Europe' (Wieringen, 1980–1, 73).

German military engineering

The war with the Dutch rapidly brought Louis into collision with Austria, Bavaria, Brandenburg and the lesser powers of the Empire. What was the calibre of these German enemies?

If prolixity in military literature had the power to win wars, then the Germans would have reached Paris in the first campaign. A host of authors carried a mass of international motifs forward into the seventeenth and eighteenth centuries. In the earlier years we discover writers like Grotte (*Neue Manier mit Wenigen Kosten Festungen zu Bauen*, Munich, 1618), J. H. Sattler (*Fortificatio*, Bale, 1619, 1620 and 1627), and the Wilhelm Dilich (*Peribologia*, Frankfurt, 1640), who sensibly eschewed complicated geometrical calculations and referred the reader instead to his beautiful engravings of various fortress types.

Over the next three-quarters of a century the Germans more than made up for their previous reticence on the subject of fortification. The mere list of some of the lesser writers is lengthy enough:

Matthias Dögen, the Brandenburger (see p. 23)

Christoph Heidemann, the Bavarian (see p. 24)

Johann Bernhard Scheither (see p. 14) *Novissima Praxis Militaris*, Brunswick, 1672)

Hans Zader, a Swedish officer of German birth (*Manuale Fortificatorie*, Alt-Stettin, 1679; *Der Verstärckten Vestung*, 1691)

C. Neubauer (*Discursus et Verae Architecturae Militaris Praxis*, Stargard, 1679)

Ernst Friedrich Borgsdorf, the Austrian (*Die Unüberwindliche Festung*, Ulm, 1682; *Die Befestigte Stütze eines Fürstenthums*, Nuremberg, 1686; *Academia Fortificatoria*, Vienna, 1694; *Neu-Triumphirende Fortification*, Vienna 1703)

Werdmüller, the Swiss colonel (*Der Probierstein der Ingenieure*, Frankfurt, 1685; *Schauplatz der Alten und Neuen Fortifikations-Maximen*, Frankfurt, 1689)

Johann Heinrich Behr (*Der aufs Neu-verschantzte Turenne*, *c.* 1677, and Frankfurt, 1690)

Voigt (*Nouvelle Manière de Fortifier*, Jena, 1713)

Harsch (*Dissertatio de Architectura Militari*, Freiburg, 1719)

Leonhard Christoph Sturm (*Architectura Militaris Hypothetico-Eclectica*, Vienna and Nuremberg, 1729, 1736, 1739, 1755)

Landsberg, a Dutchman who entered the Saxon service (*Neue Grund-Risse und Entwürffe der Kriegs-Bau-Kunst*, Dresden and Leipzig, 1737, a translation of his French original of, 1712)

An impressively large number of the German authors were practical engineers and gunners, and several of them appear to have been spurred on to commit their thoughts to paper by shared experiences like the defence of Candia in aid of the Venetians, or the humiliations at the hands of the French, who were ravaging much of western Germany. On this matter Behr wrote in about 1677:

> nowadays everybody is talking about the destruction and exactions being visited upon our lands, the burning-down of towns, and the besieging, storming and capture of fortified cities and castles which used to be considered, if not absolutely impregnable, at least very well secured. Field battles are in comparison scarcely a topic of conversation. . . . Indeed at the present time the whole art of war seems to come down to shrewd attacks and artful fortifications. Strongholds are

being assailed and taken one after the other. We do not know whether to attribute their fall to the effective techniques, superior forces and skill of the enemy, or to considerations like the inexperience and corruptibility of the governors, the weakness of the garrisons, the terror and rebelliousness of the townsmen, or slowness in mounting expeditions of relief. (*Der aufs Neu-verschanzte Turenne*, Introduction)

From Italy the Germans inherited the bastion, with the general proportions given to it by Speckle, and the retired flanks which reached their extreme in the six-fold monstrosity advocated by Neubauer. The Netherlandish fausse-braye was held in high regard by many authors, even after it had gone out of fashion in its homeland, and it was applied on a large scale when Dresden was re-fortified in the 1680s. There was, however, no German equivalent of Pagan, to transform the most useful of the old inventions into a harmonious whole.

Of all the German authors of the time, Georg Rimpler certainly caused the most stir. His career exemplified the exciting and varied life which was open to the contemporary engineer. Rimpler was born in 1634 or 1635, the son of a butcher in Leisnig in Upper Saxony, hard by the Castle of Colditz. At about the age of twenty he entered the Swedish service as a simple musketeer, which accorded with the affinity between the Swedish and German nations, and the mood of the time:

> Rimpler would not have embraced military service by chance. He was a man of lively, vaulting spirit, and a soldier through and through, as was to be shown later. The whole century was military in its character. The endless wars offered a rapid succession of honourable tasks and employments to every man of boldness and enterprise. (Kittler, 1951, 144)

After taking part in the defence of Riga against the Russians in 1654, Rimpler found time to acquire a liberal education in Nuremberg under the direction of the painter and mathematician Georg Gork. In 1669 he accompanied the Swedish general Count Königsmarck to the Venetian fortress of Candia, then under siege by the Turks, and he shared in the bitter defence which so influenced his thinking and that of all his comrades. In marked contrast, a period in the French employ enabled Rimpler to join in the Dutch campaign of 1672 and witness the defence of fortresses at its feeblest. Thereafter his doings are obscure until he emerges in 1683 as chief engineer in the Imperial service, and Rüdiger Starhemberg's right-hand man in the defence of Vienna against the Turks. On 25 July, while leading a sortie, he received a shot which shattered his arm. He died of the effects on 2 August.

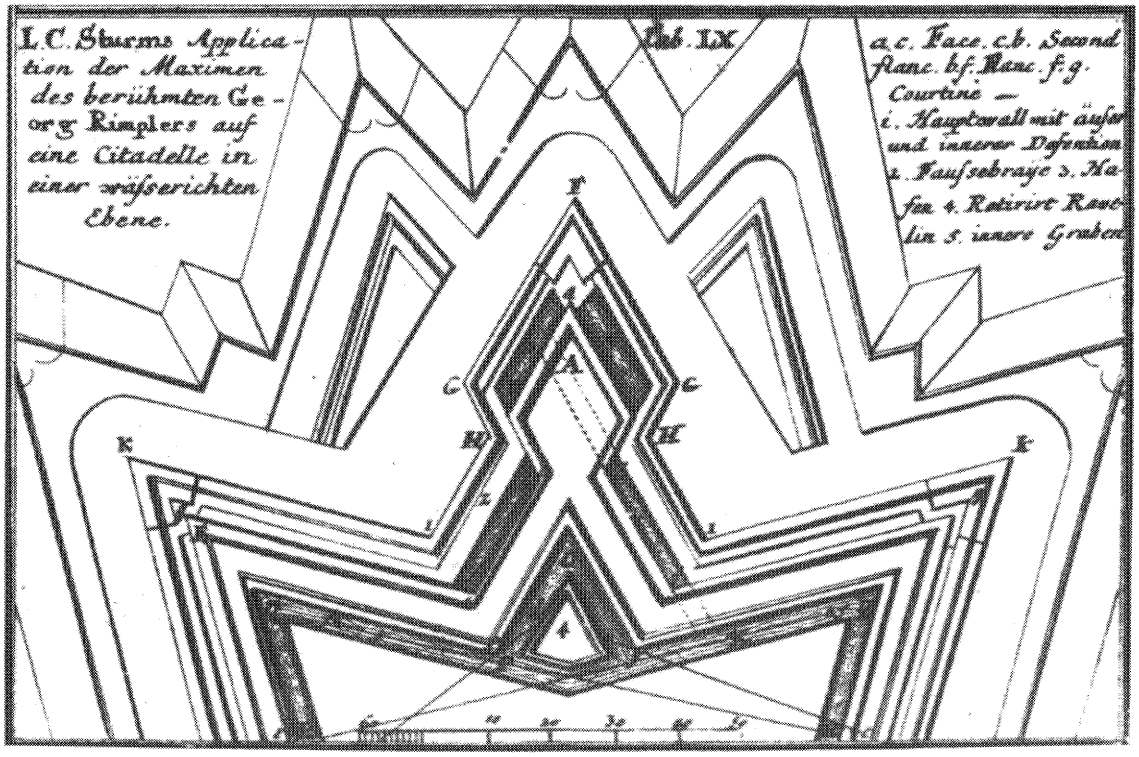
The heroic Rimpler's fame was reinforced by a number of writings in which he expressed his views in peculiar and forceful language. His first book was *Ein Dreyfacher Tractat von den Festungen*, Nuremberg, 1673. His friend Christian Neubauer claimed that the designs were complicated and expensive (*Wohlmeynende Gedancken*, Kölln-am-Spree, 1673). Rimpler replied in *Die Befestigte Festung*, Frankfurt, 1674, and he went on to defend himself against another critic (and veteran of Candia) in his *Herrn Joh. Bernh Scheithers Ingenieurs, Furiöser Sturm auf die Befestigte Festung totaliter abgeschlagen*, Frankfurt, 1678.

In general terms Rimpler deplored the abandonment of the hollow, casemated wall in favour of the earth-filled rampart of the last century. In Rimpler's opinion the only use of the open ramparts was to

> remind the soldier of his mortality, calling out to him: 'Comrade! Thou art dust, and through the action of bombs and mines to dust thou shalt return. Therefore prepare thyself to meet thy God and die in a Christian manner!' (Kittler, 1951, 216)

He admitted that there was a good deal of prejudice against casemated works, but pointed out that their great resistance at Candia showed powerful advantages.

Thus far Rimpler's case was clear and well-argued, but when he came to put forward a design of his own he was overcome by the Gothic obscurity that was the affliction of fortification writers of Teutonic blood. The body of his work is a mass of jargon, contradictions and bewildering detail, and lacks any plans which might have made any sense of the tangle – one story has it that he ordered all his drawings to be burnt before his eyes, while he lay on his death-bed at Vienna. There is no indica-



11 Sturm's reconstruction of the Rimpler trace

tion of where, if anywhere, he intended to site his famous casemates. All that is certain is that any fortress built according to his notions would have been very complicated and very expensive.

What became known as the 'Rimpler trace' was the product of later writers and editors who possibly found more sense in Rimpler's ramblings than they actually held. These were L. C. Sturm (*Freundliche Wettstreit der Französischen, Holländischen und Deutschen Kriegsbaukunst*, Augsburg, 1718, 1740) and L. A. Herlin (*Herrn Georg Rimplers . . . samtliche Schriften der Fortifikation*, Dresden and Leipzig, 1724).

However, there were probably good reasons why Rimpler (and indeed Vauban and Coehoorn) left such disappointing printed memoranda on the subject of fortification.

> His master [the Emperor] afforded him pay and bread over a period of time, and it was quite justifiable for Rimpler to have reserved his principles for the eyes of the Emperor alone, to have explained them to him in detail, and to have applied them to the defence of his lands. An engineer who hangs out his art for public display at every crossroads is the equivalent of a counsellor of state . . . who gives the enemies of his fatherland written notification of all the policies and principles which tend to the maintenance and improvement of his sovereign's interests. (Behr, 1690, Introduction)

Vanity was also at stake. Sturm compared the great engineers with 'those fencing-masters who hold back a particular thrust, which they never teach to their pupils, and which for this reason they call the "master stroke"' (Sturm, 1710, Introduction).

How far is it possible to detect 'national' tendencies in German fortification of the time? In the nineteenth century, when such things were considered important, Rudolf Eickmayer (*Die Kriegskunst nach Grundsätzen*, Leipzig, 1821) made some very far-fetched connections between the casemated gunports to be found in the designs of Dürer and Rimpler and those advocated in the later