

LOUIS DE TOUSARD AND HIS "ARTILLERISTS COMPANION"

AN INVESTIGATION OF SOURCE MATERIAL FOR NAPOLEONIC PERIOD ORDNANCE

by Donald E. Graves

INTRODUCTION

Louis de Tousard was a remarkable man who had a profound impact on the early military history of the United States. Born in Paris in 1749, Tousard entered the French artillery school at Strasbourg and graduated as a second lieutenant in 1769. [1] At the outbreak of the American Revolution, Tousard, with the recommendation of Benjamin Franklin, was seconded to the American army and arrived at Portsmouth, New Hampshire, in January, 1777. Tousard served as an aide to Lafayette in the ill-fated Canadian campaign and at the battle of Brandywine and Germantown. At the battle of Rhode Island on 28 August, 1778, Tousard sustained a severe wound to his right arm which was later amputated at his request so that he could earlier return to duty. For his gallantry, Congress brevetted him a lieutenant-colonel and gave him a lifetime pension of \$30.00 a month. [2]

After being wounded, Tousard returned to France where he was promoted major in French service and made a chevalier of St. Louis with the cross of that order. In 1784 he was promoted lieutenant-colonel and sent to

Santo Domingo where he performed excellent service in the black uprisings in the colony during the early 1790's. In 1792, Tousard fell afoul of the new political regime in France when he protested the arrest and deportation of his commanding officer. Tousard's action resulted in him joining that officer in prison. Through the intercession of the American minister, Tousard was released in February, 1793, but he was immediately dismissed from French service [3].

Tousard emigrated to the United States where, in 1795, he was commissioned a major in the 2nd Regiment of U.S. Artillery. During his service in the U.S. artillery, Tousard planned and superintended the construction of fortifications at Fort Mifflin, Pennsylvania, Newport, Rhode Island, and West Point, New York. In 1800, Tousard was promoted lieutenant-colonel and appointed inspector of U.S. artillery. [4] Perhaps one of the greatest services Tousard rendered to the United States was to impress upon Washington the importance of establishing a military academy for the young republic at West Point

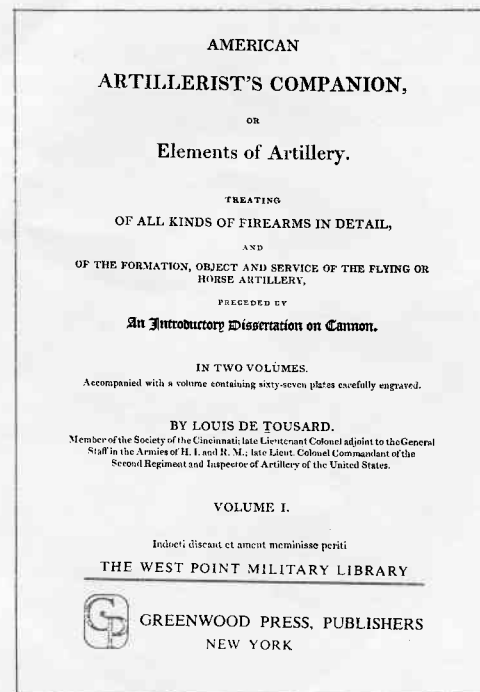
and, until his retirement from U.S. service in 1802, he served as the *de facto* commandant of the academy.

In 1802, Tousard returned to France and was reinstated in the French army. He served in (and survived) the disastrous LeClerc expedition to Santo Domingo in 1802 and took his retirement the same year. He was not to have a long rest. In 1805, Tousard was sent back to America to serve as chancellor of commercial relations at New Orleans and later was appointed vice-consul in Philadelphia. In 1809, he was transferred to Baltimore to protect the American wife and child of Napoleon's brother, Jerome. He remained there until 1811, when he was transferred to New Orleans as vice-consul. In 1816, Tousard returned to France and died the following year at the age of 68, having led a colorful and useful life in the service of two nations.

TOUSARD'S ARTILLERIST'S COMPANION

The events of Tousard's life have secured him a lasting place in American military history but he also left an important printed monument entitled *American Artillerist's Companion, or Elements of Artillery* which was published in 1809 and reprinted in 1969. [5] Tousard began this work in 1795 at the request of no less a person than George Washington who, lamenting "the absolute want of an elementary treatise on artillery," asked Tousard to compile such a treatise and to include in it English translations of the best French authorities on artillery matters. [6] For fourteen years, Tousard worked on this project with three purposes in mind. He first wanted to demonstrate the necessity of formal instruction for those interested in a military career. Secondly, he wanted to demonstrate that, of all the branches of service, the mastery of artillery required the most study. Finally, Tousard wanted to illustrate to the reader the advantages of the Gribeauval system of artillery. [7] The finished work, consisting of two volumes of text totalling 1,197 pages and a volume of 67 plates, admirably accomplished all three purposes.

The *Artillerist's Companion* enjoyed a good publication record. Tousard had obtained the patronage of both President Madison and the Secretary of the Navy who placed an advance order of 20 copies for his department. [8] In 1810, the Secretary of War, Jacob Eustis, ordered 20 copies of the *Companion* to be purchased at a cost of \$14.95 per set (not an inconsiderable sum at that time) and bound in calf with the lettering "War Department." [9] When young William Wade joined the U.S. artillery as an officer in 1813, he was informed by his superiors "that I could gain more instruction in its duties from Toussard's [sic] Artillery than any other work." [10] With the outbreak of war in 1812, the *Companion* was in demand and soon became so scarce that artillery officers requested the War Department to provide them with copies. [11] Possibly due to its expense, however, the *Companion* only went through one printing

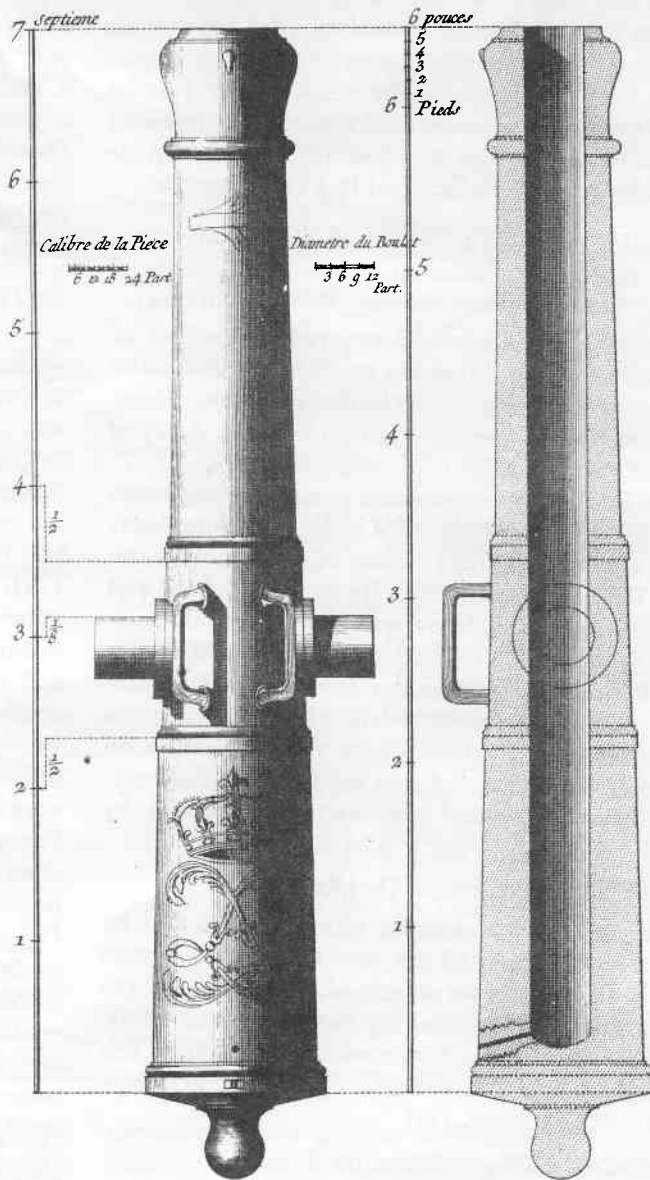
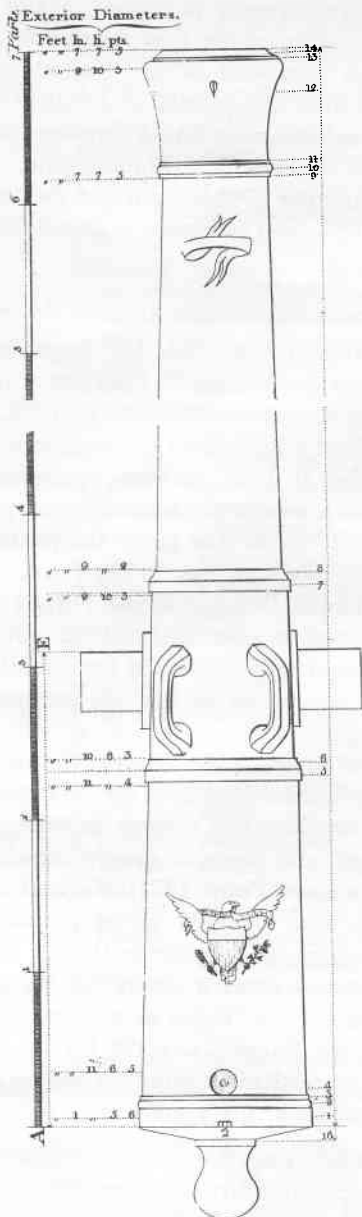


The original title page was used for the 1969 edition with only the substitution of the new publisher's logo.

and became an extremely rare item until its deserved reprinting a century and a half later.

The *Artillerist's Companion* is an important title in the bibliographic history of smooth-bore ordnance because it represents a conscientious effort on the part of its author to base his work on the best available sources of the time and, thus, represents the "state of the art" of artillery writing in 1809. The *Companion* does have some weaknesses and these should be noted. As he admits in the text, Tousard did not have access to the unpublished manuscripts in the Royal Military Academy at Woolwich and much of his information on English artillery is drawn from such standard published works as Muller, James, and Abye. What Tousard lacked in English material, he made up for with his French sources with the result that the *Companion* is the only available English-language translation of many of the prominent French authorities such as Gassendi, D'Urtubie, and Du Puget. This fact alone ensures the *Companion* a prominent place in the published texts on smooth-bore artillery.

One caveat should be sounded about the *Companion* and this concerns its reliability as a source for American ordnance of the War of 1812 period. Although Tousard was an officer in the U.S. artillery and included much information on American ordnance in the text of the *Companion*, the plates purporting to be American guns of the period are, in reality, what Tousard would have liked to have seen in service. These plates actually illustrate French ordnance of the Gribeauval system with the patriotic addition of the eagle emblem of the young republic. Although published in 1809, Tousard's



Left: Plan of a 12 pounder field gun from Plate V of Tousard's *Companion* showing the dimensions and the Eagle of the newly formed Republic. Right: The same gun from the *Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts et des Metiers* illustrating the Gripeauval system which was introduced in France in 1765.

Companion can not be regarded as a definitive source for U.S. ordnance of the War of 1812 period.

The *Artillerist's Companion* was compiled from over 75 published and unpublished sources. It is the intention of the author of this article to undertake an investigation of these sources beginning with the major French and English language sources and to leave the "minor sources" for a future article. This investigation will serve both as a biographical and a bibliographical guide to the artillery literature of the late 18th and early 19th century; a guide which may prove of some use to the student of such literature. An additional purpose

of the present author is to attempt to delineate what material these authors contributed to the *Companion* and this is accomplished by means of the tables accompanying the text. These tables are by no means definitive. Tousard took a certain amount of liberty with his sources, often interspersing his own writing among copied material with no clear distinction between the two texts. The tables are, at best, an indication of which authors on artillery matters an experienced commentator thought worthy and for what subjects he trusted their worthiness. The serious student is urged to consult the original texts. Although an attempt has been made to achieve com-

pleteness, the writer was unable to uncover all of the *Companion* sources. Tousard sometimes did not provide enough information regarding titles or the correct spelling of an author's name for the original source to be located. About ninety per cent of the sources however have been identified and are described in the article which follows, or will be included in a future article.

MAJOR FRENCH LANGUAGE SOURCES

Andréossy: General Victor-Antoine, Baron Andréossy.

Born in 1747, Andréossy entered the school of military engineering at Mezieres in 1766. He graduated in 1768 and was commissioned a lieutenant of engineers. Andreossy served as a senior engineer with the Army of the Pyrenees and in 1798-1799, with the army of Switzerland. In 1799, he was promoted general of engineers and, in 1803, inspector-general of engineers. Andréossy served as a senior engineer officer in the French campaigns of 1805, 1806, and 1809. He retired in 1814 and died in 1819. [12] Andréossy was the author of *Campagne sur le Main et la Rednitz de l'armee gallo-batave* (Paris, 1802) and *Operations des pontonniers française en Italie . . . 1795 and 1798* (Paris, 1803). Andreossy's main contribution to the *Companion* was his lectures on fortification theory delivered first at l'Ecole de Polytechnique in Paris and later translated into English by Captain George Izard of the U.S. Artillery. [13]

De Mouy: Lieutenant-General De Mouy.

Little is known about this officer except that he presided over the tests of the new Gribeauval system and was the author of an unpublished treatise on the experiments in artillery ranging carried out at Strasbourg in 1764. Tousard and other authors quote from this treatise and it seems to have been regarded as an important work on the subject. [14]

De Scheel: Captain Henri Othon De Scheel.

Actually, Captain Heinrich Othon Von Scheel of the Royal Danish Artillery but the French spelling is more common. De Scheel was a Danish officer who became interested in the controversy which raged in print in the 1760's and 1770's among French officers over the merits of the new Gribeauval system of artillery. Captain De Scheel summarized the various writings of the proponents and opponents of the new system in a published volume which appeared in 1777. A second and more complete edition was published in two volumes at Paris in 1795 and entitled *Mémoires D'Artillerie, Contenant L'Artillerie Nouvelle ou Les Changemens Faits Dans L'Artillerie Française en 1765, avec l'expose et l'analyse des Objections qui ont été faits contre ces changemens*. The first volume consists of a detailed technical description of the Gribeauval system of artillery with the accompanying plates. The second volume is a summary of the printed controversy over the new system. In 1800,

the U.S. War Department published Major Jonathan Williams's translation of the first volume of De Scheel with new plates engraved in the United States. The American translation was entitled *A Treatise of Artillery containing a New System, or The Alterations Made in the French Artillery Since 1765*. (Philadelphia, 1800) [15] Tousard used both the 1795 French and the 1800 American edition of De Scheel as source material for the *Artillerists Companion*.

Du Puget: Colonel Edme-Jean-Antoine Du Puget.

Born at Joinville in 1742, Du Puget entered the artillery school at Strasbourg in 1756 but transferred to the engineering school at Méziers in 1759. Du Puget was commissioned a lieutenant of engineers and fought in Corsica in 1768. In 1784, he was appointed inspector-general of fortifications in the Isles d'Amerique. Returning to France in 1786, he was given the position of military tutor to the Dauphin, heir to the French throne. In 1791, he was named Director of the Forges of Artillery but was imprisoned as a Royalist in 1792. Although later released, Du Puget was dismissed from military service and spent the remainder of his life farming until his death in 1801. [16]

Du Puget (sometimes Dupuget) was a strong defender of the Vallière system of artillery and published several works extolling this system including: *Essai sur l'usage de l'artillerie dans la guerre de campagne et dans celles de sièges* (Paris, 1771); *Recueil de quelques petits ouvrages qui peuvent servir de supplement a l'Essai sur l'usage de l'artillerie* (1772), and *Procé-verbal des épreuves faites a douay sur les portées des pieces de 4 longues et de celles de 4 courtes de nouveau modele* (n.d.). Du Puget's support for an obsolescent system did not blemish his reputation and he remained a respected author on artillery matters. [17]

The Encyclopédie: Encyclopédie ou Dictionnaire Raisonné des Sciences, des arts et des metiers.—Denis Diderot, J.L. D'Alembert, and others.

During the mid-eighteenth century, a group of French intellectuals and scientists under the general guidance of Denis Diderot, attempted to assemble accumulated knowledge in the sciences, arts, and manufacturing industries into a compact and coherent form. The result was the *Encyclopédie*, a collection of articles with accompanying plates published in separate volumes over a 20 year period. The *Encyclopédie* included articles on the military arts, one of which was artillery. Tousard drew heavily from material found in two articles dated 1773 by "A.A." entitled "Artillerie de campagne ou de bataille" and "Canon de Campagne ou de bataille" contained in the Supplement Texts, Volumes I and II. [18] The authorship of these articles is attributed to Guillaume Le Blond (1704-1781), author of *Elemons de la guerre des sièges ou Traite de l'artillerie* (Paris, 1743)

TABLE 1: Major French Language Sources Used by Tousard

Author	Vol. & page	Subject Matter
Andréossy	I, 404-426	Introduction to the study of fortification.
	I, 427-441	Summary Essay on fortification.
	II, 226, 262	Artillery experiments in 1793.
De Mouy	I, 55-56	Construction of batteries with little breadth.
De Scheel	I, 247-260	Manufacture of mortar bombs.
	I, 261-268	Manufacture of bombs & grenades.
	I, 343-347	Manufacture of cartridges.
	I, 363	Manufacture of slow match.
	I, 380	Manufacture of quick match.
	II, 1-14	Light artillery.
	II, 295	Alterations to field artillery carriages
	II, 306-312	Construction of travelling carriages for battering guns.
	II, 315-334	Construction of garrison, field, howitzer, and Rostang carriages.
	II, 563-566	Description of an implement invented by Gribeauval.
Du Puget	I, 31	Height of <i>genouilleres</i> in batteries.
	I, 51-52	Constructing batteries on marsh and rock.
	I, 54	Marsh ground and its effect on artillery.
Encyclopédie	I, 73-75	Construction of batteries.
	I, 311-312	Exercise of battering pieces.
	II, 122-126	Service of a field 12 pdr. (attributed in the <i>Companion</i> to Du Portail, this is taken directly from the <i>Encyclopédie</i>).
Gassendi	I, 111-115	Field batteries.
	I, 146-147	Placing of trunnions & rimbases.
	I, 163	Types of iron ore.
	I, 173-177	The use of steel for casting.
	I, 179-180	The use of steel for casting.
	I, 196	Use of brass and iron for casting.
	I, 319-332	Exercise of mortars and howitzers.
	I, 343	Table of the dimensions of powder measures.
	II, 167-198	On Mountain Artillery.
		II, 216
	II, 262-264	On hollow shot.
	II, 415-435	On military bridging.
	II, 586	Experiments with powder.
	<i>Gribeauval/Reg. of 1765.</i>	
	I, xviii	Position of trunnions.
	I, xxiii	Relationships between caliber/bore/shot/windage.
	I, 56-58	Of coastal batteries and seacoast carriages.
	I, 145-152	On the construction of brass ordnance.
	II, 223-226	On the pointing of guns.
	II, 262	Memorial on coast batteries, 1778.
	<i>Lamartilliere</i>	
	I, 153-154	Metallurgy.
	I, 158-159	Judging cast iron.
	I, 160	Iron for casting.
	I, 371-372	Manufacture of matches.
	II, 523-527	Mixtures used for casting ordnance.
	II, 586	On the composition of gun powder.
	<i>Manuscript Volumes of Artillery.</i>	
	<i>D'Ungubie</i>	
	I, i-lxxv	The general introductory section.
	I, 29	Table of everything necessary in the construction of a battery.
	I, 55-56	Construction of batteries with little breadth.
	I, 84-85	Of breaching batteries.
	I, 268-269	Shell-fuzes.
	I, 280	Quick matches.
	I, 311-312	Duties of gunners and the exercise of battering pieces.
	II, 476-515	Of artillery mechanical manoeuvres.
	II, 556-563	The French method of proving ordnance.

N.B. No distinction is made in the above table between the appearance of an author in either the text or a footnote in the *Companion*.

and *L'Artillerie Raisonné* (Paris, 1761). [19] Le Blond was also the editor of the 1745 edition of St. Remy's *Mémoires d'Artillerie* and a personal friend of Valiere the younger. His bias against the Gribeauval system is evident in both *Encyclopédie* articles.

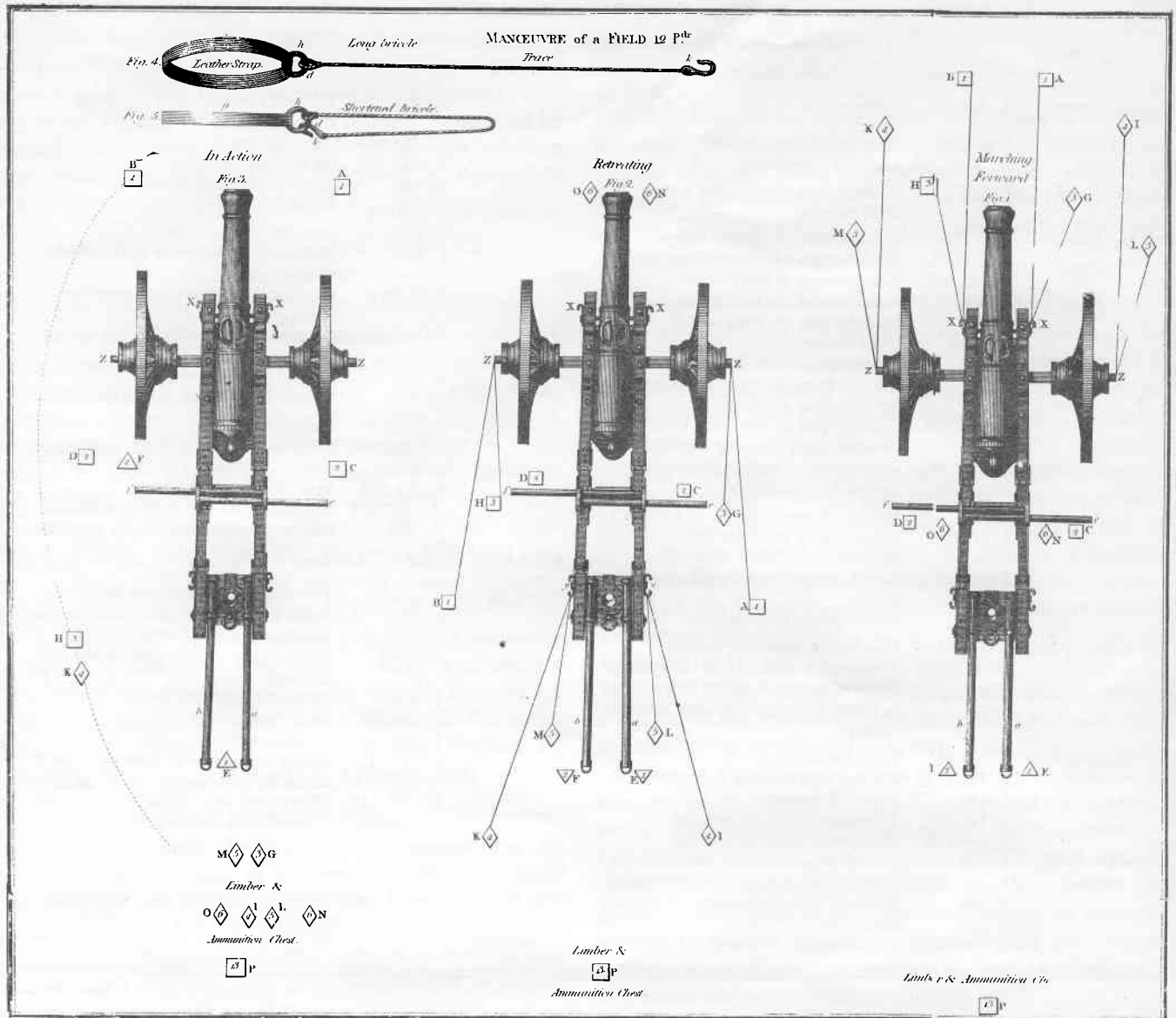
Gassendi: General Jean-Jacques-Basilien, Comte de Gassendi.

Gassendi was born in the Basse-Alpes in 1748, and became an *aspirant* in the artillery in 1767 and a lieutenant in 1768. Promoted to captain in 1779, he had under his command, the young Lieutenant Bonaparte. After promotion to *chef du bataillon* in 1793, Gassendi was sent to the Army of Italy. He was the director of artillery at the siege of Toulon in 1793 but was suspended from service during 1794-95 as a suspected royalist. He was re-instated in 1795, promoted *chef de brigade* and in 1798 was appointed commander of the park of artillery of the Army of England. In 1802, he was named commandant of the school of artillery at Auxonne and, in 1805,

named inspector-general of French artillery. Gassendi became a count of the empire in 1809 and a senator in 1813. He died in 1828. [20] Gassendi was the author of the *Aide-Mémoire a l'usage des officiers d'artillerie de France*. (Paris, 1780, 1790, 1801, 1809, 1813) commonly referred to as the *Aide-Mémoire*. The *Aide-Mémoire* is the most technical published period ordnance work this author has examined and the 1801 edition which was used in the preparation of this article contains about 1,200 pages of material varying from the composition of gun carriage paint to instructions on bridging rivers.

Gribeauval: General Jean-Baptiste Vaquette de Gribeauval, and the Regulation of 1765.

Gribeauval was born at Amiens in 1715 and entered the artillery as a volunteer in 1732. By 1752, he was a captain in the corps of miners and was sent on a special mission to Prussia to study the most recent technological advances in that state's ordnance. Promoted lieutenant-colonel in 1757, he was detached to the



Gribeauval's "Manoeuvres" of a 12 pdr. field piece from
Tousard's *Artillerist's Companion*.

service of Austria. During the Seven Years War, Gribeauval conducted the attack and defence of many fortified cities and, by 1762, had been promoted to the rank of field marshal in the Austrian army. [21] On his return to France, Gribeauval used the experience gained during his Prussian and Austrian tours to develop an entirely new artillery system for France which included radical changes in both equipment and organization. After much controversy, the new system was adopted in 1765. Gribeauval died in 1789, not living long enough to see the system which bears his name achieve great success under Napoleon.

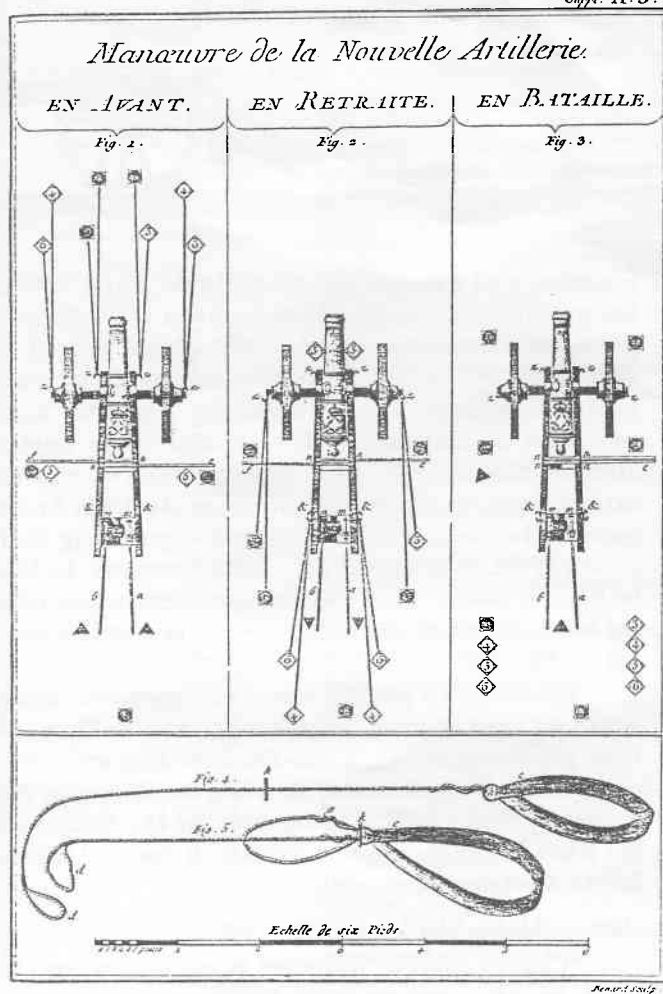
Gribeauval was an innovative genius but he was not a prolific writer. The *Collections de Mémoires Authentiques qui ont été présentés à messieurs les maréchaux de France* (1744) contains some articles by him.

Tousard quotes at length from Gribeauval's unpublished memorial on sea coast batteries apparently written in 1778. The product of Gribeauval's genius is preserved in the *Tables des Constructions des principaux attirails d'artillerie* (3 Vols. in 4 parts, Paris, 1792) which contains 125 plates, a publication restricted to only 104 copies by the French government as it was the technical source from which all equipment of the Gribeauval system was produced. Many of the plates from this rare work are included in the 1795 edition of De Scheel and reprinted in the 1800 American edition.

The *Regulation of 1765* was the official promulgation of the Gribeauval system of French artillery.

Lamartillière: General Jean, Comte Fabre de Lamartillière.

Lamartillière was born in Nice in 1732 and commissioned as a lieutenant in the French artillery in 1757. After seeing active service in the Seven Years War,



Art Militaire, Nouvelle artillerie.

Gribeauval's "Manoeuvres" from the Supplement to the *Encyclopédie* published in 1776.

Lamartilliere was stationed in Guadaloupe in 1764-1768. He was promoted captain in 1772 and inspector of the Royal Foundry at Douai in 1779. Promotion to major (1778), lieutenant-colonel (1791), and colonel (1792) soon followed. Attached to the Army of the Pyrenes and promoted general in 1793, Lamartilliere was wounded for a second time in 1795. He was appointed artillery commander of the Army of Italy in 1800 and named inspector General of artillery in 1801. Lamartilliere retired in 1802 and died in 1819. [22] His major published work was *Reflexions sur la fabrication des bouches a feu*. . . (Paris, 1790, 1796) which Tousard used as a source for his comments on casting.

Manuscript Volumes of Artillery.

Perhaps the single greatest source which Tousard used for the *Companion* was the five large manuscript volumes of all the memorials and treatises written by the best-informed officers of the French artillery. These were not printed but formed the subjects of lectures to

junior officers who were expected to make their own working copies. [23] This system of artillery officer education was similar to that employed by the Royal Artillery where lectures at the Royal Military Academy were copied by the cadets to provide a working text for service use. As far as the writer knows, the French manuscript volumes of artillery were never published but, undoubtedly, many of the authors whom Tousard consulted, also used them as source material. With one exception Tousard, unfortunately, did not footnote his use of the manuscript volumes.

d'Urtubie: General Theodore-Bernard-Simon d'Urtubie de Rogicourt.

D'Urtubie de Rogicourt (commonly know as D'Urtubie) was born at La Fere in 1741, and appointed a page to the queen in 1752. In 1755, at the tender age of fourteen, he became a *sous-lieutenant* in the artillery. He was promoted a lieutenant in 1759, a captain in 1767, a major in 1781 and lieutenant-colonel and assistant director of the arsenal at La Fere in 1791. In 1793, he was suspended from duty on suspicion of being a royalist supporter. Re-instated in 1795, he was promoted general in 1797 and served as inspector-general of artillery from 1798-1800 before retiring in 1801. D'Urtubie died in 1807. [24] D'Urtubie was the author of *Le Petit Manuel d'artilleur*. . . (Bastia, 1785) and *Manuel de l'artilleur* (Paris, 1787, later editions, 1792, 1794 and 1795). This one volume work was a standard reference in Europe but, by the time of the *Companion's* publication, had been superceded by the more up to date *Aide-Mémoire* of Gassendi. [25]

MAJOR ENGLISH LANGUAGE SOURCES

Tousard did not enjoy the same access to English artillery sources that he had with the French material and was forced to rely heavily on standard works such as Muller and Adye. He makes several references in the *Companion* to "the mysteries of the school of Woolwich" and it is evident that he was aware of potentially valuable material in the Royal Military Academy which he could not consult. Under these circumstances, Tousard did the best he could and was honest enough to state his doubts about the value of some of the English material he included in the *Companion*.

Adye: Captain Ralph Willett Adye.

The son of Stephen Payne Adye, a distinguished R.A. officer, R.W. Adye was commissioned as a 2nd Lieutenant in the Royal Artillery in 1781. He was promoted 1st lieutenant in 1790, captain lieutenant in 1795, and captain in 1801. [26] Adye died in 1808. [27] His *Little Bombardier and Pocket Gunner* dedicated "To the Junior Officers of the Royal Regiment of Artillery," first appeared in 1798 and underwent numerous printings and revisions in 1801, 1802, 1813, and later. An

An 8 P^{dr} with its Limber and Prolonge doubled to half its length the billets locked in the loop a under the bolster to loop or ring 8 feet from the bolster to reduce the Prolonge to $\frac{2}{3}$ its length.

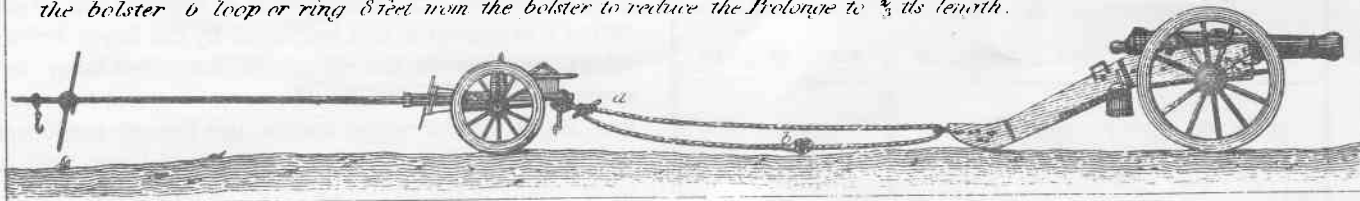


Illustration from Tousard's *American Artillerist's Companion, or Elements of Artillery*.

American edition "Printed for E. Larkins, Boston, by William Greenough, Charleston," published in 1804, was presumably, the edition Tousard used in compiling the *Companion* and was the edition consulted in the preparation of this article. The *Bombardier and Pocket Gunner* is a useful little volume with an alphabetical arrangement containing a plethora of information for the serving artillery officer.

D'Antoni: Major-General Alessandro Vittoria Papacino D'Antoni.

D'Antoni (sometimes D'Antony or D'Anthony) was an officer in the Royal Sardinian Artillery and Chief Director of the Royal Military Academy of Artillery and Fortifications at Turin. [28]

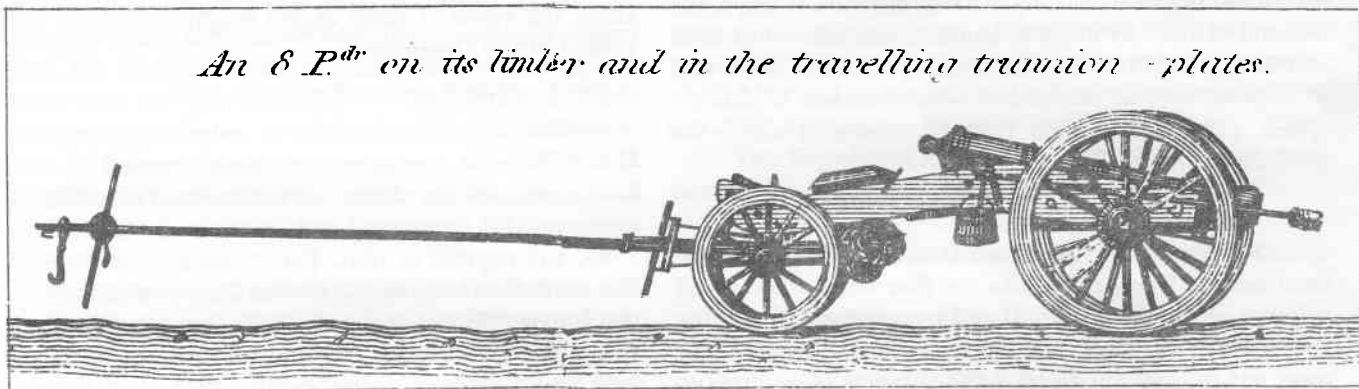
Tousard was impressed by D'Antoni's treatises on artillery and regarded him as being "among the best military writers of the present age" and, at one time, intended to publish his own translation of D'Antoni's work. [29] In compiling the *Companion*, however, he utilized Capt. Charles Thomson's translation entitled *A Treatise on Gun-Powder; A Treatise on Fire-Arms; and A Treatise on the Service of Artillery in Time of War* (London, 1789) and this is the edition referred to in the accompanying table.

Glenie: James Glenie

James Glenie was born in Fifeshire in 1750 and was a cadet at the Royal Military Academy in 1775. He was

Illustration of an 8 pdr. field piece constructed on the Gribeauval system from Tousard's *American Artillerist's Companion*.

An 8 P^{dr} on its limber and in the travelling transition plates.



commissioned a second Lieutenant in the Royal Artillery but transferred to the Royal Engineers in 1779. Although promoted first lieutenant in 1787, Glenie retired the same year and emigrated to New Brunswick where he became a member of the Legislative Assembly and a contractor for ship timber. Glenie returned to England after his business failed and was employed as engineer extraordinary by the Earl of Chatham. In 1806, he was appointed instructor of artillery and engineering to the cadets of the Honourable East India Company. In 1809, he became involved in a public controversy which resulted in his dismissal. Glenie died in poverty at Chelsea in 1817. [30]

- Glenie was a prolific writer and produced several works on mathematics, engineering, and artillery, the most prominent of which was *The New History of Gunnery, with a New Method of Deriving the Theory of Projectiles in Vacuo from the Properties of the Square and the Rhombus* (Edinburgh, 1776) which Tousard utilized for the *Companion*.

James: Major Charles James.

Charles James's birthdate is not known. In 1793-1794, he was a captain in the Middlesex militia and, in 1795-1797, he held the same rank in the North York militia. In 1806, James was commissioned as a major in the Corps of Artillery Drivers and went on half-pay when this post was abolished in 1812. [31] James authored a number of military reference works including drill books, treatises on military law and the *Regimental Companion, containing a Relation of the Duties of every officer in the British Army* (London, 1799). He is best-remembered for his *New and Enlarged Military Dictionary* (1802, 1805, 1811, 1817). The 1805 edition was used for the preparation of this article.

TABLE 2: Major English Language Sources Used by Tousard.

Author	Vol. & page	Subject matter				
Adye	I, 9-10	Construction of batteries & ricochet fire.	II, 170-177	Definition of charette, serpent, and <i>sous-garde</i> .		
	I, 200-201	French artillery of 1765.	II, 235	Definition of bricole.		
	I, 201	Length & weight of English guns.	II, 253	Description of red hot balls.		
	I, 333-335	English exercise of heavy ordnance.	II, 435-436	Definition of caisson.		
	I, 340	Charges for battering pieces.	II, 445-475	On mechanical powers.		
	II, 256	Hot shot grates.	II, 550	Boring machines.		
	D'Antoni	I, xxi	Windage.	II, 568	Desagulier's proving methods.	
		I, lx-lxix	Thickness of gun metal.	II, 590	Definition of granoir.	
		I, lxii-lxiv	Placing of vents.	Muller	I, xiv-xvi	On French artillery systems and St. Remy.
		I, lxxi	Use of wads mixed with powder.		I, xiv Intro.	On French artillery.
I, 69-102		Construction, types, & placement of batteries & the service of batteries.	I, xv-xvi		Trunnions.	
I, 129-130		Caliber and its relation to range.	I, xxv		On reinforces.	
I, 131		Iron siege guns.	I, xxvii		On muzzles.	
I, 135		Length of battering pieces.	I, xxix		Muller on St. Remy, length of guns.	
I, 221-222		On mortars.	I, xxxi-xxxii		Muller on Armstrong's experiments in 1736 relative to the length of bore.	
I, 226-228		Thickness of metal on mortars.	I, xlii, xlvi, lxii		Muller on Armstrong's experiments on caliber and length of guns.	
I, 338-340	Ascertaining the strength of charge.	I, lxii	Placing of vent.			
II, 18-21	Orbicular cavities in bores.	I, 133-134	Length of garrison/seige ordnance.			
II, 520-521	How explosive charges destroy the bores of guns.	I, 142	Parts of a gun.			
II, 551-555	Examination and proof of new guns.	I, 191	Iron as opposed to brass for casting.			
II, 613	Round and irregular powder.	I, 204-219	Muller's construction of brass, iron, naval, garrison & field pieces.			
Glenie	II, 13	On the importance of experiments.	I, 281-298	On English mortars & howitzers.		
	James	I, 23	Definition of a gabion.	I, 342	Tables of charges & measures.	
I, 36		Definition of rapporteur.	I, 362-363	Tables of diameters of shot/calibers of English & French guns.		
I, 39		Definition of hurdles.	II, 8-9	Col. Weidemann's light pieces.		
I, 117		Table of English and foreign weights.	II, 215-216	Distances at sea—a table.		
I, 142		Definition of a chace.	II, 357-368	Gover's gun carriage.		
I, 143		Definition of a base ring.	II, 420-421	On pontoons.		
I, 281		Partridge mortars.	II, 519	Defects of brass guns.		
I, 285		Definitions of cylindrical, spheric and parabolic chambers.	II, 566-568	English method of proof.		
I, 292		Definition and description of bomb-vessels and sea mortar beds.	Robins	I, 63	Penetration of shot.	
I, 320		Definition of a bombardier.		II, ix	Importance of study for a soldier.	
I, 349	Molds for common shot.	Stevens	II, 130-145	Service of a field 6 pounder.		
I, 350	Definitions of foundry terms.					
I, 389-390	Definitions of portfires and artillery arms.					
I, 442-443	Invention of bastions.					
I, 502-522	Origin of military mining.					
II, 29	Definition of manoeuvre and <i>avant-train</i> .					

N.B. No distinction has been made in the above table between the appearance of an author in either the text or in a footnote in the *Companion*.

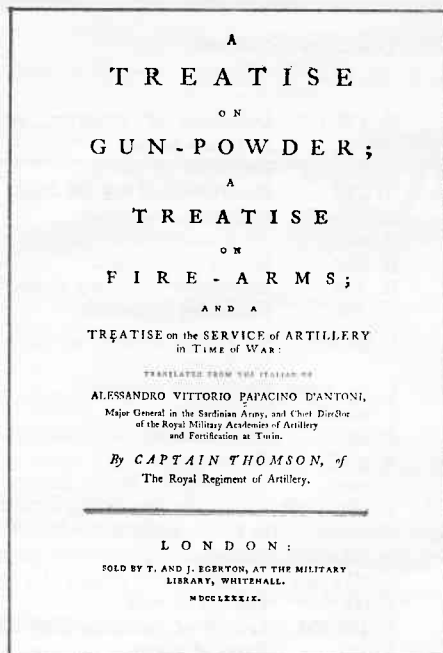
Muller: John Muller.

John Muller was born in Germany in 1699 and was appointed Headmaster of the Royal Military Academy in 1741 and retired from that post in 1766. John Muller died in 1784. [32] Muller was the author of numerous works on the subjects of fortifications and artillery, the most important of which for the purpose of this article is, *A Treatise of Artillery*. . . (London, 1757, 1768 and 1780). Tousard used the 1780 edition of the *Treatise* for the *Companion* and criticized Muller severely for publishing this work fifteen years after the introduction of the Gribeauval system without once mentioning the new system. [33] Muller's reputation as a commentator on artillery matters, however, has recently been partially salvaged in the pages of this journal. As A.B. Caruana points out in his article "John Muller's Treatise of Artillery," the 1780 edition, for which Muller is criticized by

Tousard, is possibly not even Muller's responsibility but that of his publisher, John Millan, who simply reprinted the book without revision. [34] Despite his criticisms, Tousard quotes Muller at length and the sections of the *Companion* based on Muller must be read with the warning that this represents British artillery practice current in 1757, not 1780, and certainly not 1809, the date of the *Companion*. [35]

Robins: Benjamin Robins.

Born at Bath in 1707, Robins was a practising engineer and mathematician who authored many works on these subjects. In 1742, to support his unsuccessful candidature for the appointment of professor of fortifications at the Royal Military Academy, he published his best-known work, *New Principles of Gunnery* (London, 1742). Robins was a professional scientific researcher



The title page of D'Antoni's *Treatise on . . . Fire-Arms* published in 1789. This was a primary reference used by Tousard.

who is credited with inventing the ballistic pendulum for measuring the velocity of projectiles. In 1749, he was appointed engineer-general in India and arrived there in 1750 but died the following year with pen in hand, in the midst of drawing up a report on fortifications. [36]

In 1745, *New Principles of Gunnery* was translated into German by the mathematician, Leonard Euler, who

1. Unless otherwise noted, all details of Tousard's life are from a *Dictionary of American Biography*, New York, 1936, Vol. 18, pp. 605-6.
2. Louis de Tousard, *American Artillerist's Companion, or Elements of Artillery*, Philadelphia, 3 Vols., 1809, 1813. (hereafter Tousard) I, xxii.
3. Louis de Tousard, *Justification of Lewis Tousard Addressed To The National Convention of France*. . . , Philadelphia, 1793, pp. 32-33.
4. Francis B. Heitman, *Historical Register and Dictionary of the United States Army*, Washington, 2 Vols. 1900, I, 966.
5. The two volumes of text were originally printed by C. and A. Conrad, Philadelphia, in 1809. The volume of plates was printed by Bradford and Innskeep in 1813. All three volumes were printed by Greenwood Press in 1969 for the West Point Military Library. Judging from some of the comments from notable readers which Tousard included in the introduction to the *Companion*, it would appear that the *Companion* may have first been published in unbound sections which were to be collected and bound by the purchaser. The author, however, has uncovered no bibliographic evidence of a publishing of the entire *Companion* prior to 1809.
6. Tousard, I, v.
8. *Ibid.*, v-vi.
8. *Ibid.*, xx.
9. U.S. National Archives, RG 107, Micro 222, Vol. 4, p. 286, Secretary of War to Tench Coxe, 21 February, 1810.
10. *Ordnance Notes*, XXV, May, 1874, p. 110.
11. U.S. National Archives, RG 107, Micro 221, Reel 47, Lt. J.N. Connor to the Secretary of War, Greenbush, 10 September, 1812.
12. Details of Andr ossy's career are from Georges Six, *Dictionnaire Biographique des G n raux, Amiraux Franais de la R volution et de l'Empire*. Paris, 1934, 2 Vols. I, p. 15 (hereafter Six).
13. Tousard, I, vii.
14. Denis Diderot, *Encyclop die, ou, Dictionnaire raisonne des sciences, des arts, et des metiers*. . . , Amsterdam, 1776, Supplement,

provided additional commentary. In 1761, it was reissued by Dr. James Wilson along with other writings by Ro-bins. It went through a further edition with the Euler commentaries in London in 1777 as *The True Principles of Gunnery Investigated and Explained Comprehending Translations of Professor Euler's Observations Upon the New Principles of Gunnery*. This was translated into French by P.L. Vilantroys as *Nouvelle experiences d'artillerie ou l'on determine la force de la poudre, de la vitesse initiale des boulets de canon* (Paris, 1802) and also by Jean-Louis Lombard as *Nouveaux principes d'artillerie* (Dijon, 1783) with additional commentary. Finally, Dr. Charles Hutton issued a revised edition entitled *New Principles of Gunnery: a new edition, corrected by Charles Hutton* (London, 1805). Tousard made use of all of these editions when compiling the *Companion*.

Stevens: Captain William Stevens.

William Stevens was a captain in the continental artillery of the American revolution who published *A System of Discipline of the Artillery of the United States of America, or, The Young Artillerist's Pocket Companion* in New York in 1797. This was the first manual of artillery drill to have been published in the United States but, in discussing artillery equipments, Stevens relied heavily on the American edition of Muller's *Treatise* published in 1779. Tousard's main use of Stevens was to provide the American artillery drill used during the revolutionary war and to compare it with the French Gribeauval drill.

- Tome I, p. 621. (hereafter *Encyclop die*).
15. Work is in progress which will result in a reprint of this work in 1983 by Museum Restoration Service, Bloomfield, Ont.
16. *Dictionnaire de Biographie Franaise*, Paris, 1970, Vol. 12, p. 552.
17. Tousard, I, xii.
18. *Encyclop die, Texte*, Vol. I, pp. 609-622, and, Vol. II, pp. 202-9.
19. Henri Othon De Scheel, *M moires D'Artillerie*. . . Paris, 1759, 2 Vols., II, p. 16. The *Traite de L'Artillerie* was translated into English as *A Treatise of Artillery* (London, 1746). The 1780 edition of this work was reprinted by Museum Restoration Service, (1965, 1977).
20. Six, *Op cit.*, I, 32-33.
21. *Nouvelle Biographie Generale*. . . , Paris, 1966, Vol. XXII, pp. 21-24.22. Six, *Op cit.*, I, 44-45.
23. Tousard, *Op cit.*, I, xvii.
24. Six, *Op cit.*, II, 123-124.
25. During the course of the research for this article, the author was unable to procure a copy of D'Urtubie in French and was forced to make reluctant use of translations from the German edition by F.H. Malherbe, *Handbuch fuer Artilleristen*. . . , Strasbourg, 1788.
26. W.H. Askwith, *List of Officers of the Royal Regiment of Artillery*, London, 1900, p. 18.
27. *Dictionary of National Biography*, London, 1890, XXI, pp. 434-5.
28. Title page of the 1798 London edition of D'Antoni.
29. Tousard, *Op. cit.*, I, xii-xiii.
30. *Dictionary of National Biography, Ibid.*
31. *Ibid.*, London, 1892, pp. 205-206.
32. *Ibid.*, London, 1894, p. 279.
33. Tousard, *Op. cit.*, I, xv.
34. Adrian B. Caruana, "John Muller's Treatise of Artillery," *The Canadian Journal, Arms Collecting*. Vol. 19, No. 2 (May, 1981), p. 53.
35. *Ibid.*, p. 56.
36. *Dictionary of National Biography*, London, 1896, XLVIII, p. 434.