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Chapter 2

William Congreve and the City of Toulouse¹

Jean-Paul Escalettes² and Philippe Jung³

The City of Toulouse is well known for containing one of the largest concentrations of European aerospace firms, with such names as Aerospatiale, Dassault, Thomson, MATRA, CNES, Air France and many others. What is less known, however, is that nearly two centuries ago an early rocket pioneer, William Congreve, saw his war rockets used against the city during the Toulouse battle. Even more interesting, he later happened to stay in the Languedoc capital while on his way to Nice on his own boat: but death caught up with him in Toulouse before he could reach his final destination.

This paper explains the significance of the use of Congreve rockets during the Toulouse battle, which was actually the last Napoleonic combat. It also elaborates on the research undertaken to try and clarify the many unknowns about Congreve's stay in Toulouse at the end of his life. This includes a search for his grave, since the original one has been displaced with the disappearance, under the builder's hammer, of the original Protestant (and Jewish) Cemetery in the town's center.

Rocketry is widely known to have had an extraordinary development in this century. Before that, popular belief has it that fireworks-like rockets were used by the Chinese in the "Old Times." However, what is less well known is that infrequent use of such rockets was made over the centuries by Arabs, Mongols, Italians and French during various wars.

Technical progress in early rockets was virtually non-existent, marked only by the addition during the Middle Ages of the stabilizing stick by the Chinese. At the turn of

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the 16th century, military use of the rocket seems to have stopped, to be forgotten for good apparently. And then, simultaneously in India and in France, the crude rocket reappeared during the second half of the 18th century, this time to remain. The use, in anger, of rockets in India was indeed to have a profound influence in France and in England. It was also the start of the connection between Congreve and Toulouse.

Indian Rockets Use (1778?-1803)

We do not know with certainty when use of military rockets started on the Indian Continent, but they are associated with Hayder Ali, the first Mahometan to come to power in the State of Mysore in 1760, with Seringapatam as its capital. Constantly battling, he was helped by the French, until defeated by the Mahrattes of Hindustan (themselves allied with the English) in 1771.

Far away, on 20 May of 1772, William Congreve, who was to become, in 1780, the comptroller of the Royal Arsenal in Woolwich, had his first son, William. This was not going to be without connection to the wars which had resumed in Mysore between Hayder and the English East India Company. There, in 1780, a confirmed use of rockets reveals that one such device provoked the explosion of four ammunition boxes and led to the routing of 4,000 men. Hayder Ali had created, apparently two years before in 1778, a corps of no less than 1,200 "rocketeers."

The fact that saltpeter, the main constituent of black powder, appears naturally on some Indian soil may explain the development there of the rocket.

When Hayder died in 1782, his son, Tippoo Sahib, succeeded him and brought his corps of rocketeers to a remarkable 5,000 men. However, abandoned by his French allies, he had to sign a peace treaty with the British in 1784. At the time, young William Congreve was very interested in new ideas, such as ballooning, a technique only two years old.

Yet war resumed again in 1790, when Tippoo, with French help, attacked the Rajah of Travancore and his English allies. On 22 April 1792, Tippoo vainly used a great number of rockets to defend his capital of Seringapatam, and he had to surrender half of his territory.

This battle, as well as the burning of the Ottoman fleet at Otchekow in 1788 by rockets of French colonel Prévot, had far-fetched consequences. France would seem to take the lead. General Belair, who had witnessed Seringapatam rockets, made proposals to the Revolution. The Comité de Salut Public, created on 6 April 1793, encouraged rocket trials. The following year, tests by Belair and one of the famous Ruggieri, Claude Fortuné, started.

In 1795, meanwhile, Congreve finished high school and switched to law studies, writing such strong editorials that he had to pay a heavy fine to Lord Berkeley.

In 1798, Colonel Prévot died, and, in 1799, Tippoo, who had started the war again, was killed defending Seringapatam despite using rockets. This was the end of 39 years of Mahometan rule in Mysore. The way was open for England to take the lead in rocketry. In 1800 the Board of Ordnance launched a program to manufacture rockets, inspired by the Indian ones, for use in India. They were not, however, powerful or precise.

On 23 September 1803, Arthur Wellesley had to contend with numerous rocket attacks during the battle of Assaye against the Mahrattes. The future Duke of Wellington was not impressed by such projectiles. Such however was not the case with everybody. But what were these objects of controversy?

Description of Indian Rockets

Two of Sultan Tippoo's rockets are displayed in the Rotunda of the Royal Artillery Museum in the Woolwich Arsenal in London. One is a cylinder of 25 x 6 cm bound by strips of hide to a blade of 91 cm length. The other is made of an iron tube of 20 x 4 cm secured by leather strips to a bamboo stick of 1.88 m length. Both of these rockets had a range of about 1 km.

Such projectiles were indeed not as deadly as bullets due to lower power and slower speed. The latter characteristic also made them sensitive to wind, rendering them inaccurate. However, they were efficient psychologically, scaring horses and annoying troops with their noise, and, when hitting, wounding or even killing people. When striking ammunition dumps their efficiency was excellent.

Enter William Congreve (1804-1809)

When Indian rockets quite naturally arrived in the Royal Arsenal directed by his father, young William could not have failed to be attracted by the novel weapon. In 1804, he bought ordinary rockets in London and tripled their range while studying the far eastern missiles.

His creative mind, his flair and his good connections enabled him to succeed where several Frenchmen had failed. He proposed attacking the Napoléon fleet in Boulogne with 15 kg rockets of 2 km range to prevent an invasion of England.

Interested, the Board of Ordnance ordered Congreve to produce bigger rockets in 1805. A demonstration in the presence of Lord Castlereigh from the War Office and Lord Mulgrave from the Foreign Office convinced William Pitt to go ahead with the proposed plan of attack on Napoléon's fleet.

On 18 November, ten launches were sent against the French with incendiary rockets. However, a sudden storm caught everybody by surprise, sinking five of the boats, and the attack was called off until later in the spring of 1806.

Congreve continued his work unabated, and by August 1806 he had built no less than 13,109 of his rockets. While negotiations in Paris with Prussia delayed the resumption of the planned attack, he improved the missiles. With an iron tube of 0.1 x 1.05 m and a 4 cm x 4.5 m stick, they weighed 15 kg and had a range of 3 km.

Then, on 8 October 1806, 18 boats launched 2,000 incendiary rockets on the French flotilla in Boulogne, in the presence of Congreve apparently. Results were mixed, with a few vessels and three houses destroyed. The conclusions were very clear however. The rocket was here to stay as a weapon. England decided to continue re-

search and to begin series production of the rockets. The Royal Navy and the Coastal batteries of Kent were equipped with the new weapons.

The sinking of one of the Boulogne launchers had allowed France to recover intact rockets. These were subjected to analysis by the chemist Vauquelin.

Despite the setback in Boulogne, Napoléon was at the height of his power after Austerlitz, only England refusing to submit. As a consequence, the Emperor had decided on a continental blockade. Tension was so high that poor Denmark, which had very cautiously maintained neutrality, was subjected to a very controversial raid by General Cathcart, officially to prevent the Danish fleet from falling into the hands of Napoléon. Congreve set sail from Yarmouth with three rocket boats. Between 2 and 5 September 1807, 3,000 rockets were fired against the hapless city of Copenhagen. The assault was terribly efficient, 2,000 people were killed and 600 houses burnt down.

About 40 vessels were stolen and the city was sacked by the Marquis of Wellesley, provoking universal indignation and reinforcing Napoléon's position.

That year, Congreve published "A Concise Account of the Origin and Progress of the Rocket System."

Congreve Rockets Everywhere (1808-1810)

In April 1809, Congreve participated in the attack on the French fleet at Rochefort. Only two boats escaped from Ile d'Aix. Some rockets were again recovered for study by, among others, the famous chemist Gay Lussac.

A few months later, in August, the battle of Anvers saw another use of the dreadful weapon after invasion of the island of Walcheren: 25 rocketeers obtained the surrender of Veer and Flessingue. Congreve, again, is said to have been there, but could he be at all these battles while a civilian?

Other nations did not stay indifferent to the rocket for long. Already Anton Mager had done some work in Austria in 1808, while Andreas von Schumacher had tested the first explosive rocket in Denmark.

But France became very active in 1809. Colonel Brunau and Captain Bigot built experimental rockets in Anvers where Ruggieri sent some of his. In Vienne, Captain Jacquier worked on the basis of Mager's activities. Later in that year, Bigot continued his work in Saint-Cyr.

Then on 8 February 1810, Napoléon created a Commission, with Monge as president, to study incendiary rockets of 2.8 km range for war in Spain (the "Independence War" of the Spanish or the "Peninsular War" of the English). The Emperor's decision was to conquer Portugal after crossing Spain. In a short seven months, Jacquier and Bigot succeeded in testing four calibers of rockets with a range of 1.7 to 3 km.

Fighting had meanwhile started in Portugal. In November, Wellington, still not very much convinced about rockets, gave way and authorized General Hill to use them in Villafranca against ships. On 13 November 1810, they failed to set a French ammunition store on fire in Santarem.

More important, but less obvious at the time, 1810 marked a shift in the fortunes of Congreve. His rockets were in wide use, he was in favor with the Prince of Wales,

but when he tried to introduce a steam press to improve the manufacturing of his weapons, this was refused for reasons of costs. As a pioneer, he was alone in his country.

But in France, tests were widespread and supported by the Emperor. On 15 December 1810, an Official Instruction was released in the Empire, as well as in Italy and Naples, concerning the training of qualified rocketeers in each artillery regiment and each military harbor.

While Congreve rockets successfully prevented the building of a bridge over the Tago, the turn of the tide had come, and soon Congreve would no longer be in the forefront.

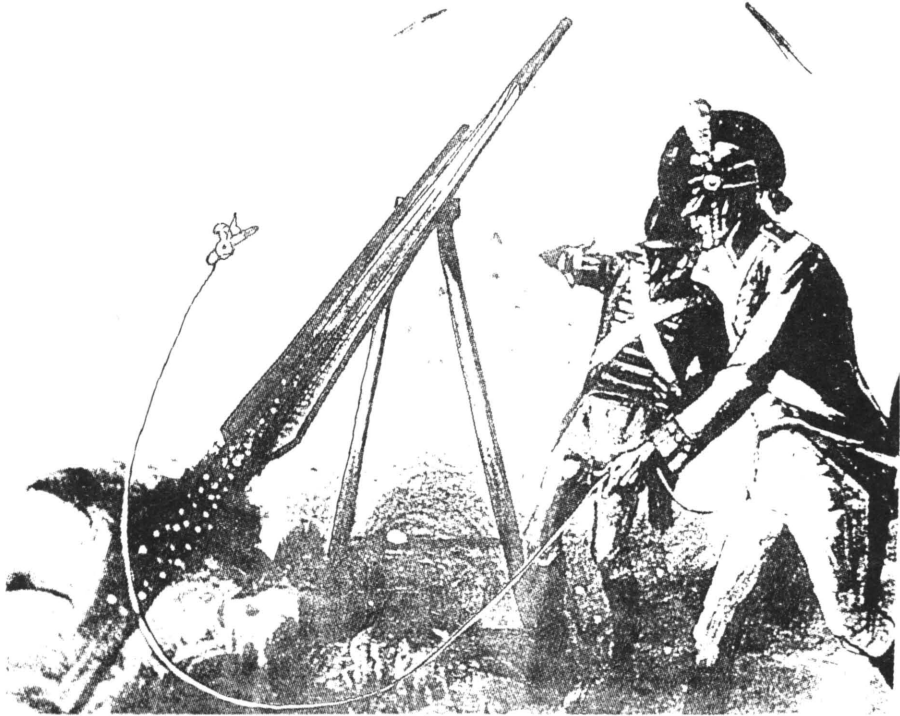


Figure 1 Rocketeers of the Rocket Corps.

Towards Peace In Europe (1811-1814)

While the year of 1811 saw Congreve rockets used in Cadix (and also, for the first time, French ones made by Jacquier in Sevilla), Schumacher started manufacturing his weapons in conditions of extreme secrecy in Frederiksvaert, and no less than five rocket shops were created in France: Boulogne, Toulon, Rochefort, Brest, Cherbourg.

Only then, in September, was a Royal Artillery Rocket Corps created in Bagshot, under the command of Captain Bogue. The influence of the Prince of Wales had been decisive. Horses were used, each one with four small caliber rockets and a launching ramp, plus others carrying 18 rockets each. Four shots could be fired per minute.

In 1811, Congreve was elected to the Royal Society, and in 1812 he entered Parliament. His rockets were being used everywhere, in India and in Chesapeake Bay in 1812. The following year in Goëhrde, Luneburg and Wittemberg, when only two men from the Corps loosened a French troop in Leipzig where the "Rocket Troop N° 2" was the only English contingent (since then called "Leipzig") and where Bogue was killed. In 1814, rockets were employed in Frederiksort, then in Anvers.

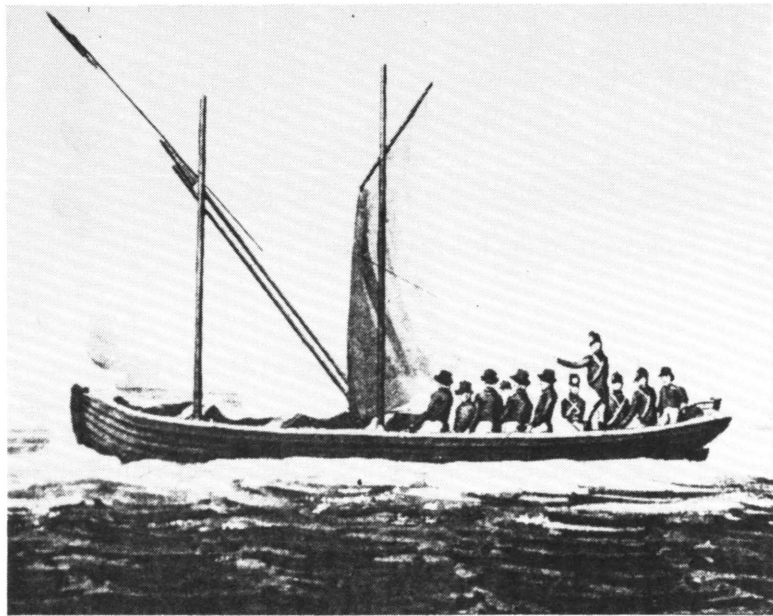
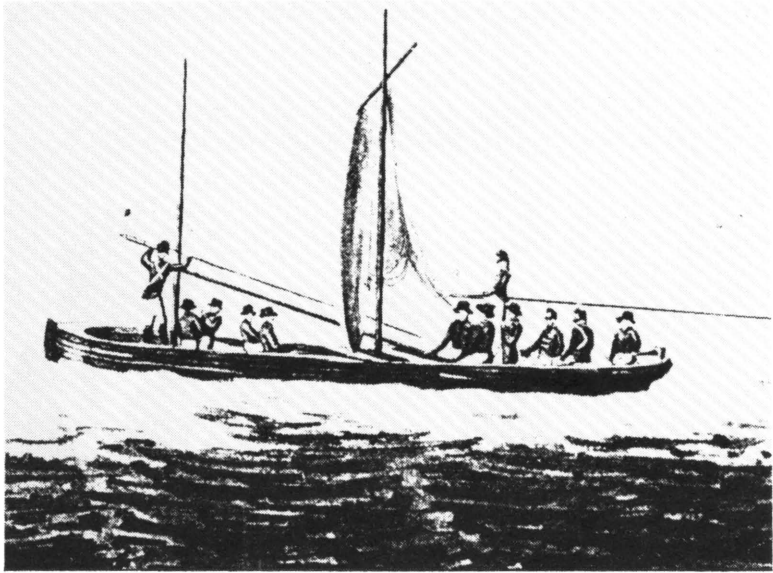


Figure 2 Bombardment of Fort Henry (U.S.A.) in 1812 by English boats.

Elsewhere, since October 1813, the Emperor had been retreating across Spain, where Wellington had, again reluctantly, accepted a detachment of the Rocket Corps. In February 1814, the weapons were used during the siege of Bayonne and on crossing the Adour. Even the Spanish used them during the liberation of Catalogna by General Michelena.

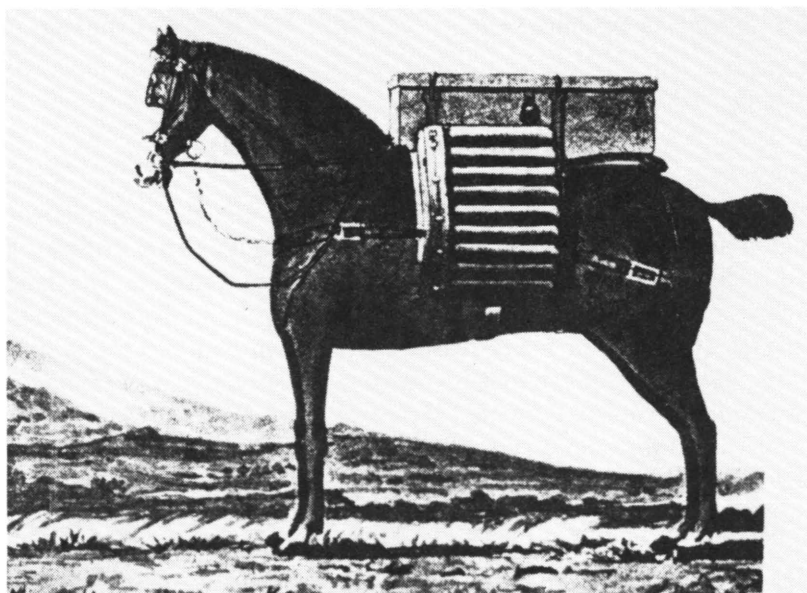
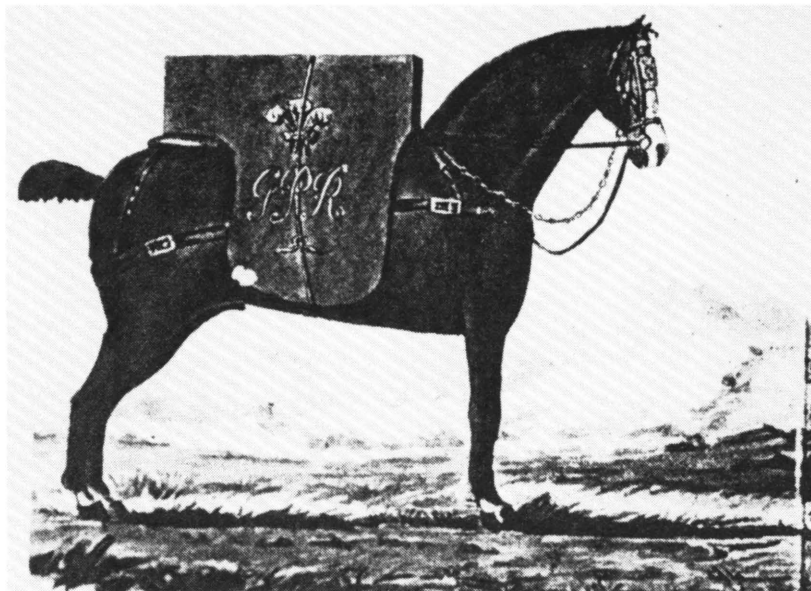


Figure 3 Horses of the Rocket Corps.

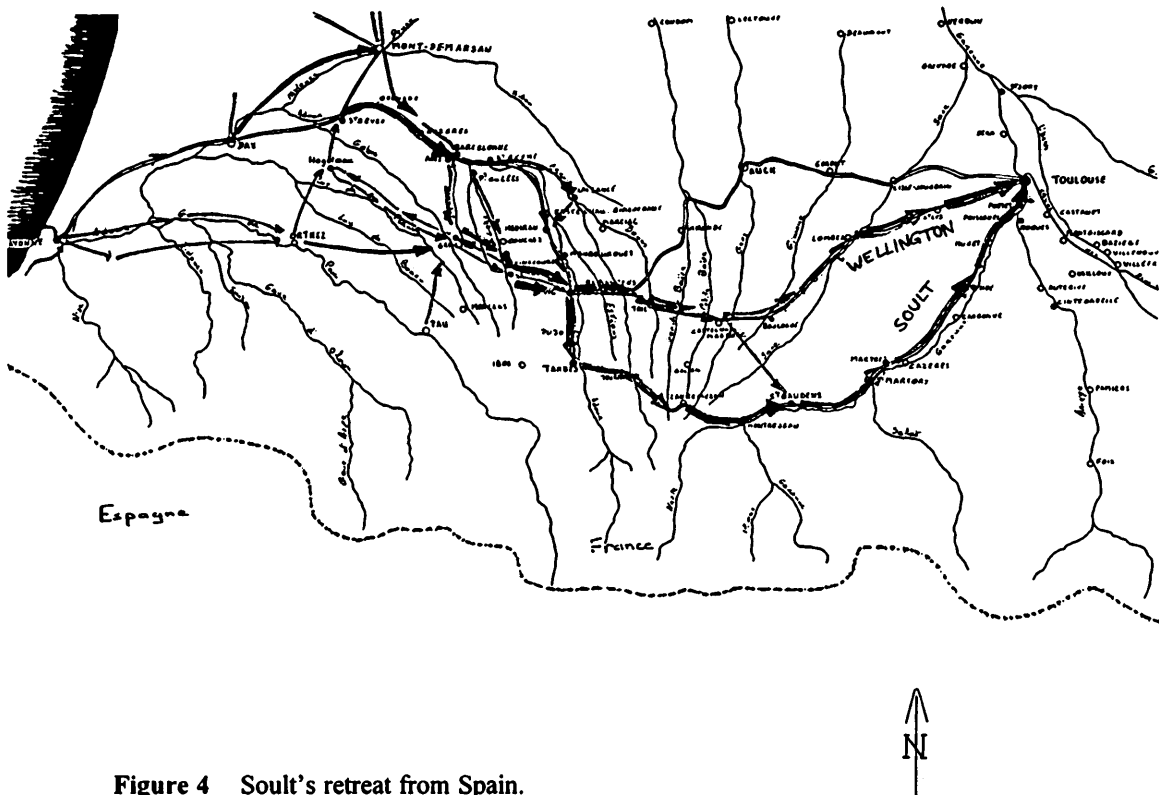


Figure 4 Soult's retreat from Spain.

The Battle of Toulouse (1814)

This nearly forgotten battle is, however, significant in many ways, as will be seen.

Wellington and his Spanish and Portuguese allies (with also a Prussian legion) had now inflicted a defeat on Field Marshal Soult's troops in Orthez. The latter, born in nearby Tarn, had to decide where to retreat. He had full powers from Napoléon.

It would be Toulouse for many reasons. This town had become a strategic point for the war in Spain, being a big depot for arms and logistics. It was inland, and thus far from any harbor which could have eased the resupply of Wellington. Furthermore, Bordeaux was well known for its old sympathies for England. Located midway between the Atlantic and the Mediterranean, Toulouse was, in fact, an ideal meeting point with the army of Field Marshal Suchet, who was coming back from Catalogna via the South East of France.

Knowing the area very well, Soult first followed the Pyrenees to the east through Tarbes and Saint-Gaudens, enticing Wellington into taking the shortest route to Toulouse, south of Auch. But this one was very hilly and muddy.

Arriving two days before the Allies on 22 March 1814, Soult could thus organize the defense of Toulouse, much to the fright of the inhabitants. The end of the Empire was looming, conscription after conscription had exhausted the population, no siege had taken place there for centuries, and there was intense fear of Spanish revenge after the sacking of Zaragoza. Actually, the prefet decided, as a precautionary measure, to withdraw all Spanish people, even if loyal to the Empire, beyond Montauban and Castres to the north.

The answer to the call for workers was so meagre that police had to be brought in. Even soldiers were reluctant to be used as laborers, so that the Field Marshal himself decided to handle the shovel for half an hour on the Bridge des Minimes.

When Wellington arrived south of the city, he logically decided, after crossing the Garonne and the Ariège, to go after the road from Toulouse to Narbonne to try to prevent the junction of the Suchet and Soult armies. He could not. Rain had been heavy and the way was very muddy.

The Allies backtracked around the town to the south and then the west. A rocket workshop was established in Colomiers (north west), not far from the location of the present airport of Blagnac. With much difficulty because of high waters, Wellington eventually managed to cross the Garonne to the north between 4 and 9 April. Only Hill remained west of the city. A rocket workshop was established in Balma (east), where a small private aircraft airfield was later to be created.

What is remarkable now is that while all this was going on, and unknown to everybody around Toulouse, the Emperor had abdicated on 6 April!

So, the battle started on 10 April 1814 under a blue sky and a strong wind, the Vent d'Autan, bearing far away the din of the confrontation. It was 0600 hours, at sunrise. The main thrust was brought by Beresford, who climbed up from the l'Hers river along the hills to the east of Toulouse. The small fort of La Sypière was defending the area, but with so-called Marie-Louise troops recently enrolled and not experienced. They were so-called because Impératrice Marie-Louise had signed their enrollment order.

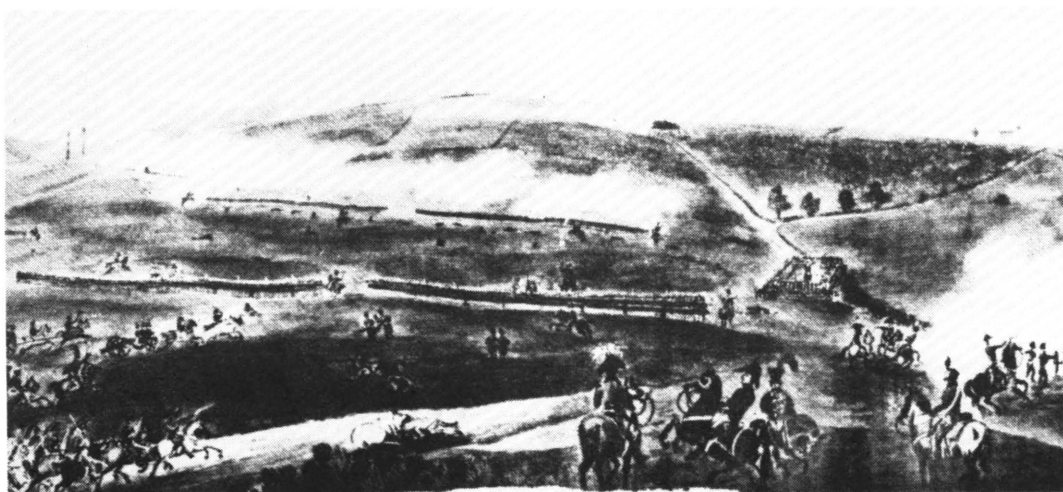


Figure 5 Attack of the Sypière Fort.

90 TOULOUSE — La Colonne commémorative de 1814
 Monument élevé sur les coteaux dominant la ville à la mémoire des
 victimes françaises et anglaises de la Bataille du 10 Avril 1814

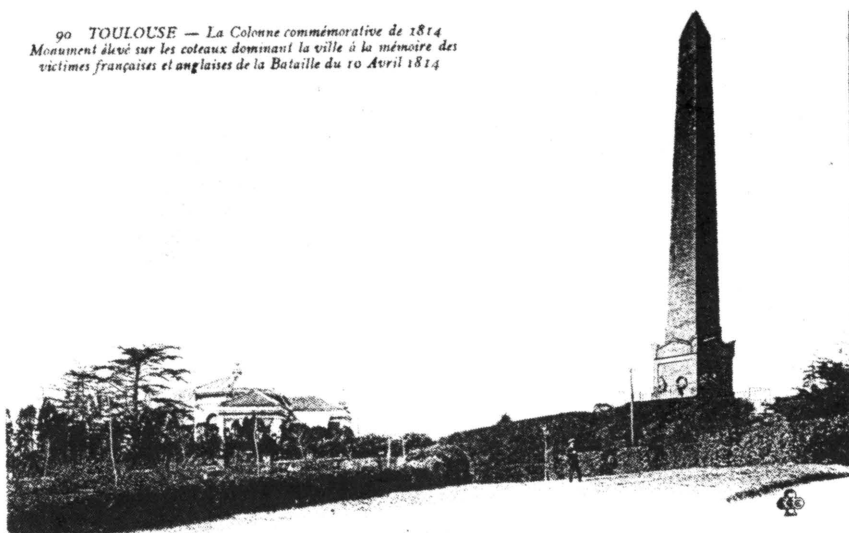


Figure 6 Obelisk of the Battle of Toulouse.

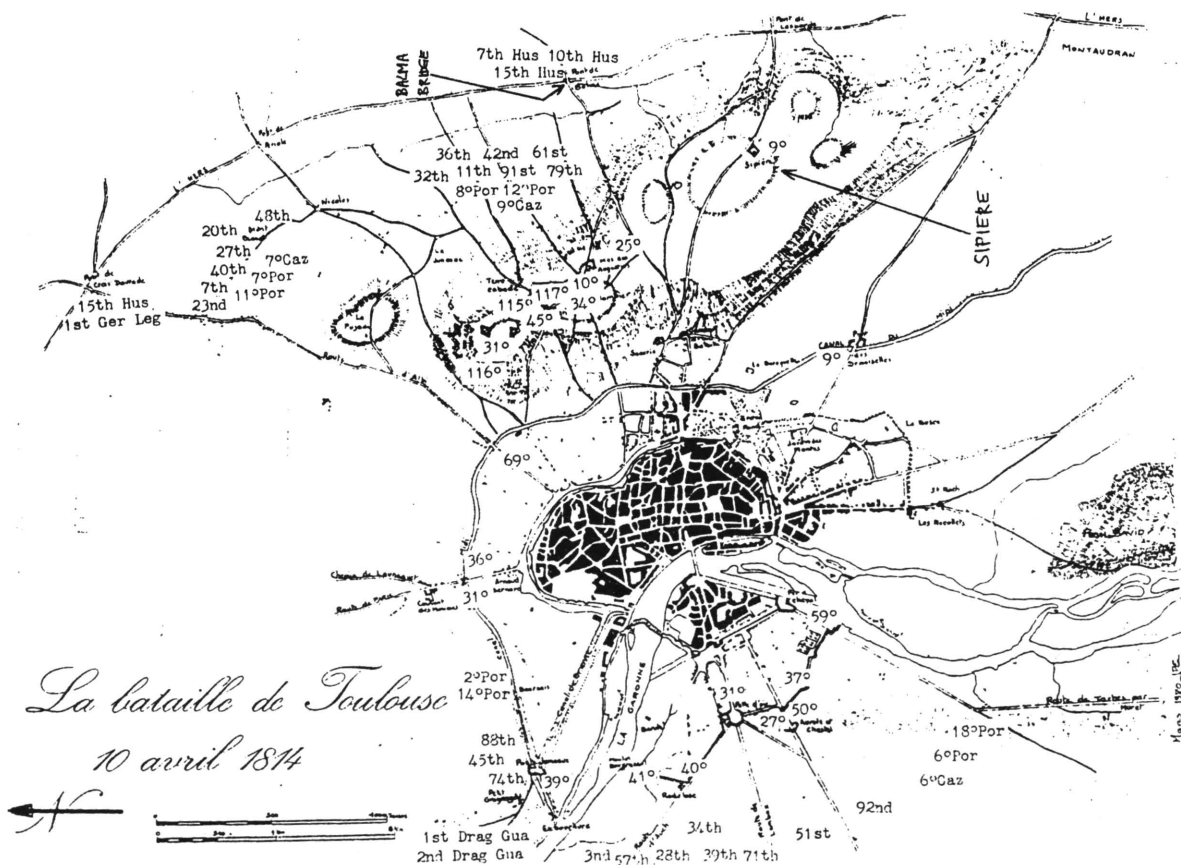


Figure 7 Battle of Toulouse - French and Allied troops.

General Taupin managed to bring his troops to the fort before the English could reach it, but this quick reaction was of no avail, as the general was killed under the fire which undercut his troops, not yet ready to fight. There was understandably some wavering among the French troops, that spread to the fort garrison, which started to retreat.

Just at that moment, a volley of Congreve rockets fell on the fort and around the Marie-Louise troops. Whistling, detonating, burning, they just brought panic among these young troops who fled, leaving the ground to the infantry, who had already learned in Spain to withstand the more noisy than deadly rockets.

Anyhow, the face of the battle had changed. It was about 1000 hours. Beresford was holding his position on one of the heights of Toulouse, overlooking the whole city, and the rockets had made a significant, if not decisive, contribution. After some skirmishes to the west and the east, the battle was over by 2100 hours, with the heights to the east fully occupied by Wellington.

Inevitably, fear of the burning down of the town, Copenhagen-fashion, quickly spread. From their vantage point, and with at least two supply sources, the English could very easily bombard Toulouse with a deluge of incendiary rockets.

The 11th was spent, by both armies, observing each other and helping the wounded. Then, unexpectedly, during the night Soult and his troops slipped out to the south-east without any move by Wellington, who could not possibly have failed to notice at least something!

Much to the dismay of the supporters of the Emperor, the population then welcomed Wellington as a liberator when he entered the town. Only later on the 13th, one full week after the abdication, news arrived that the Emperor had given way, and the Armistice was signed in Naurouze after written confirmation arrived on the 18th.

In a way, the fact that the Toulouse battle could vanish from "Big History," is yet another extraordinary facet of such a curious fight a long way from the main decision in Paris. The explanation is probably that the outcome was so quick and without bloodshed (300 French and 600 Allied killed) and with no destruction being inflicted on the "Rose City."

Congreve's connections to Toulouse did not stop there, however, and they became even stronger later.

In 1815 a new rocket shop was established in Vincennes by Captain de Brulard, who had managed to get a licence from Schumacher in 1813, with the help of a Williamson, injured by an Indian rocket stick, and claiming to be the true inventor of the "Congreve Rocket."

Congreve Gets into Trouble (1814 - 1827)

William Congreve was slowly reaching his heyday. Created Second Baronet of Walton, he succeeded his father as Comptroller at Woolwich and published "The details of the Rocket System in 1814." The next year, on 18 June 1815, saw his rockets again used in anger during the battle of Waterloo, which put a final end to the aims of the Emperor.



Figure 8 Rockets at Waterloo.

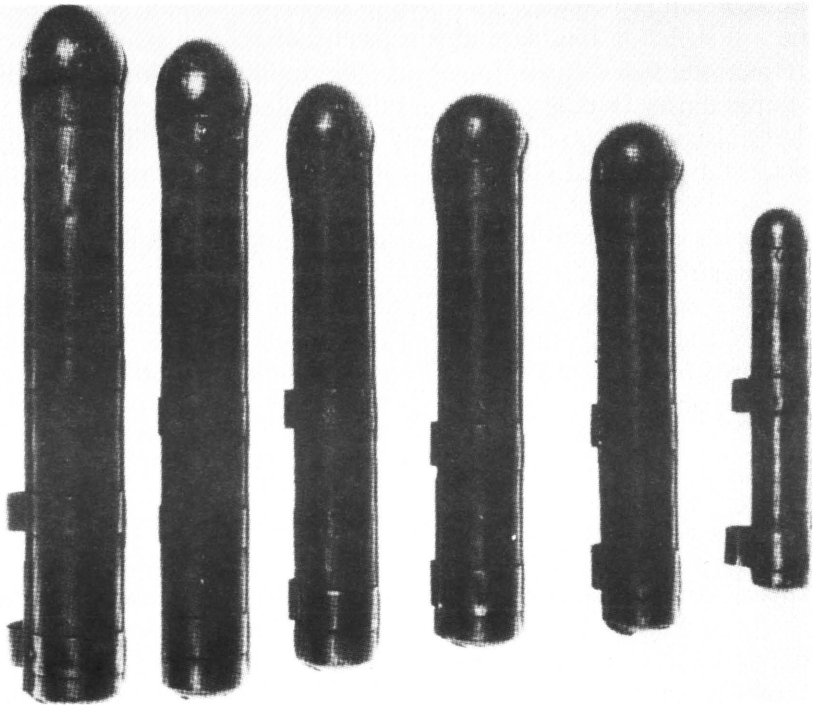


Figure 9 Five shell rockets and one shot rocket by Congreve (Science Museum, neg. 196/87).

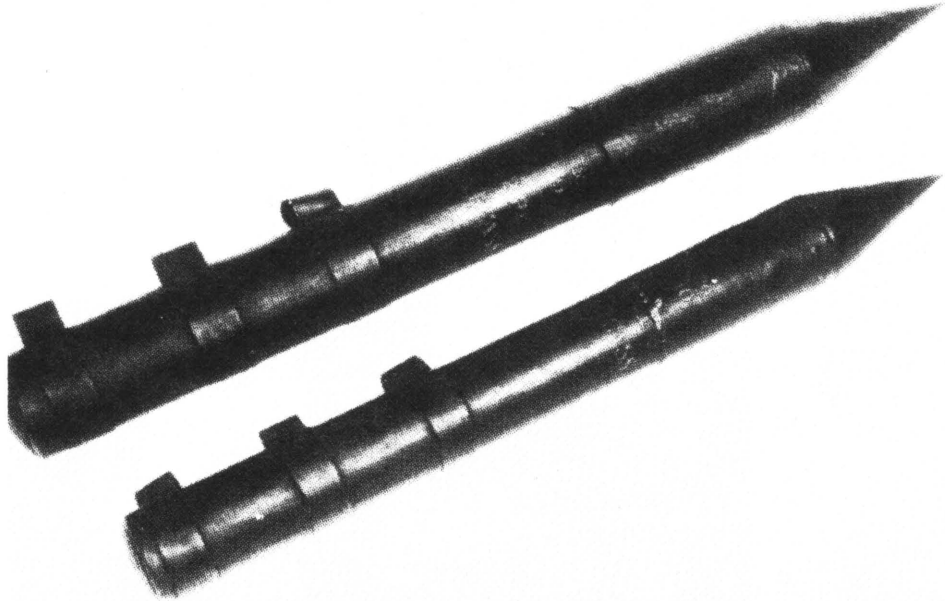


Figure 10 Congreve 42 and 32 pounder rockets (Science Museum neg. 199/87).

Always curious, and now rich, Congreve's interests diversified. For example he described a hydro pneumatic watergate. In 1817 he obtained his only military title (contrary to some references to him as Colonel or General), of Hanovarian General, something which helped him in no way in his leading of the Arsenal. The same year he fired what may have been the first rocket with a nose driven exhaust.

Meanwhile, the slow progress of rocketry in France had not been interrupted by the fall of the Empire. An Artificers Company was created with 4 km range rockets, signaling the beginning of a technological lead over Congreve machines. And by a curious coincidence, a further (secret) rocket shop was created in 1818 in Toulouse to build two types of training missiles at the rate of 20 per year.

Congreve was still not left behind, however, as he made a significant change to the rocket in 1819 by moving the stick from a lateral to a central position, thus markedly improving accuracy through better aerodynamic stability. At the time, he was apparently producing an impressive range of rockets, up to a weight of no less than 135 kg.

The following year, in 1820, Congreve reached his highest position, becoming Chief Equerry to George IV. He went on to more business-like matters, supporting financially a multi-color printing process (chromotyping), studying the lighting by gas of London, and managing a South American mine. He also created his own personal rocket workshop at Bow for export and patented, in 1823, rockets he built with rotating fins. He was still theorizing however, and, in 1827, he issued "A Treatise on the general principles, powers and facility of application of the Congreve Rocket system as compared with Artillery."

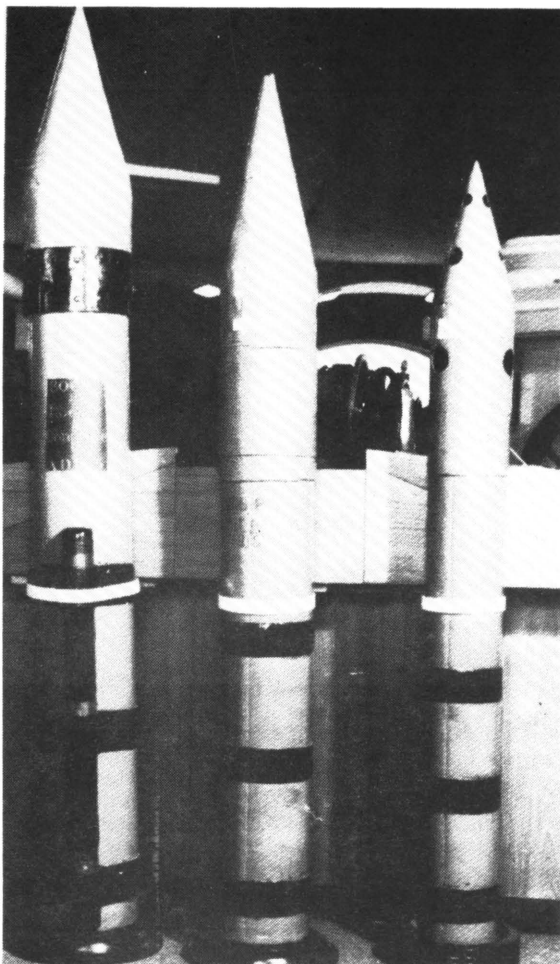


Figure 11 300-200-100 pounder Congreve incendiary rockets (Science Museum neg. 189/87).

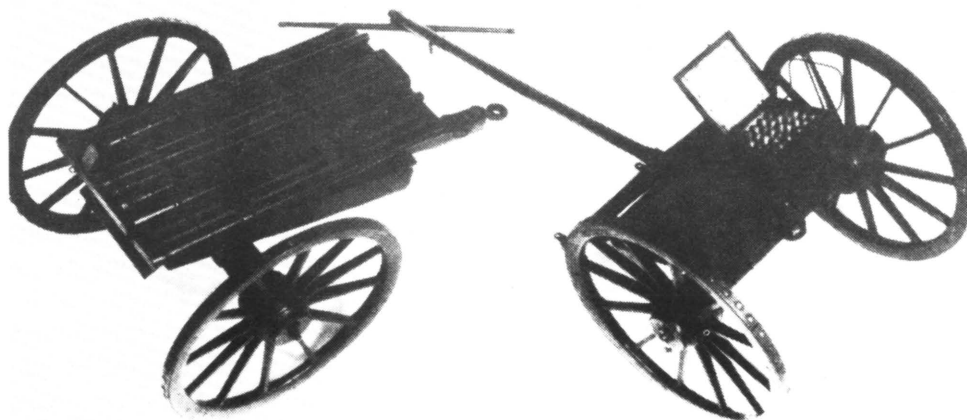


Figure 12 Congreve six pounder carriage C. 1820 (Science Museum neg. 211/87).



Figure 13 Three incendiary rockets with rotating fins - shell rocket.
Congreve C. 1823 (Science Museum neg. 1476/85).

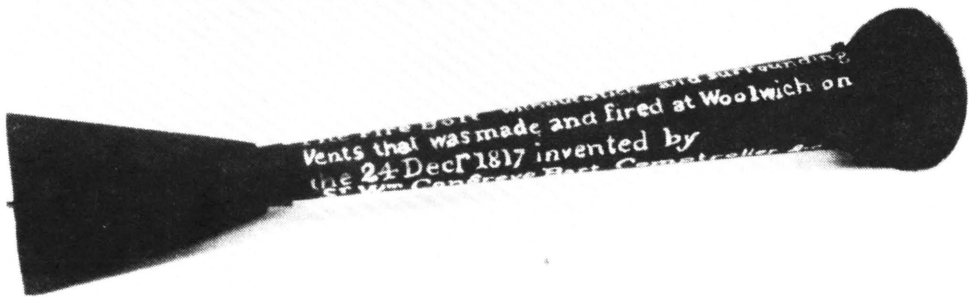


Figure 14 Congreve Fire Bolt rocket with nose exhaust of 1817
(Science Museum neg. 1474/85).

But the end was in sight. Convicted of fraud in his American business, Congreve had to leave England. We do not know for sure today when he left, what is established, however, is that at the time he was already severely crippled, his whole lower body being paralyzed.

As if to add to his downfall, his collaborator, Bedford, proposed his services, in 1827, to the Central School of pyrotechnics of Metz, which had been created in 1824 by the transfer of the Toulouse shop. That was the starting point for half a century of French dominance in rocketry.

Congreve at the Rotunda

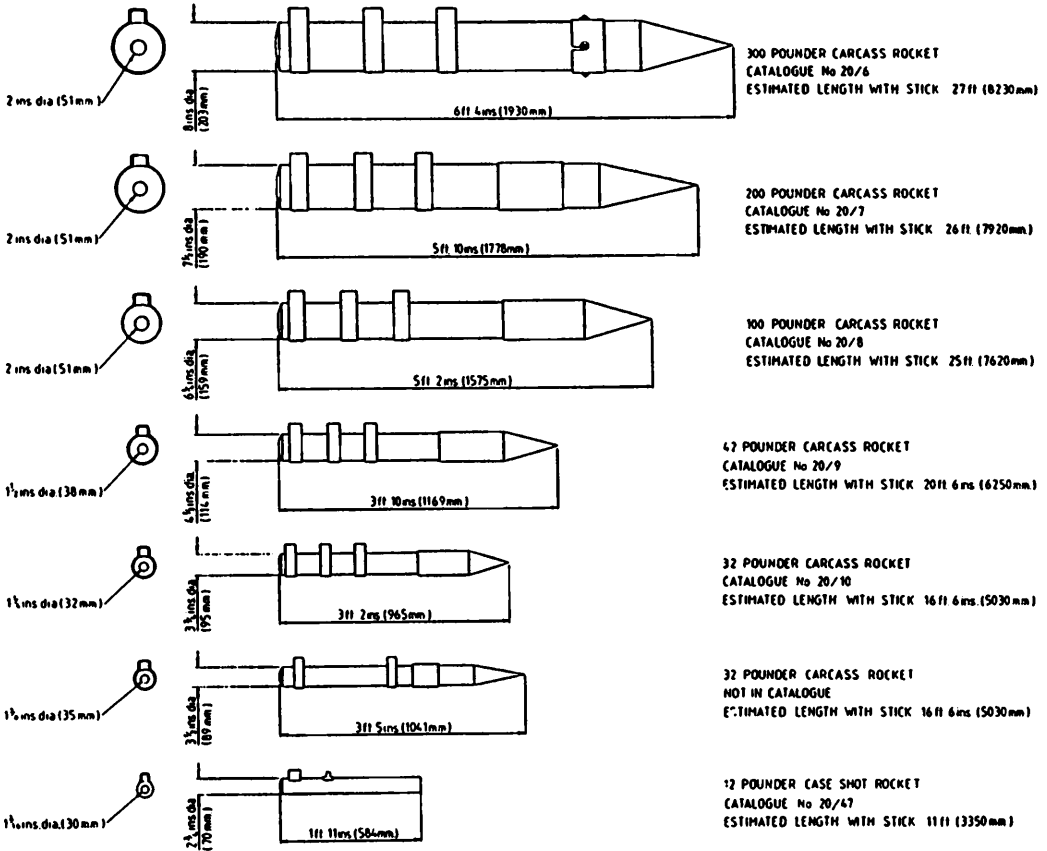


Figure 15 Dimensions of Congreve shell and pounder rockets (JBIS Vol. 40).

Congreve's Death In Toulouse (15 May 1828)

So, Congreve with his wife of Portuguese origin, Isabella Carvalho, set off for France on a boat that he had modified with an inclined ramp to allow him to board it more easily. He had even devised an ingenious wheelchair which could be deployed so as to be used as a bed.

Entering the Canal du Midi in Bordeaux, his intention was to retire in Nice. Fate had it that his journey would end in no other place than Toulouse. There was there a strong English community, probably partly as a leftover from the battle of 1814. The well known Larrey family of doctors was also living there, including the doctor of the Imperial Army. They could give efficient treatment to Congreve. It was said that they were specialists for his illness, which, however, was not described.

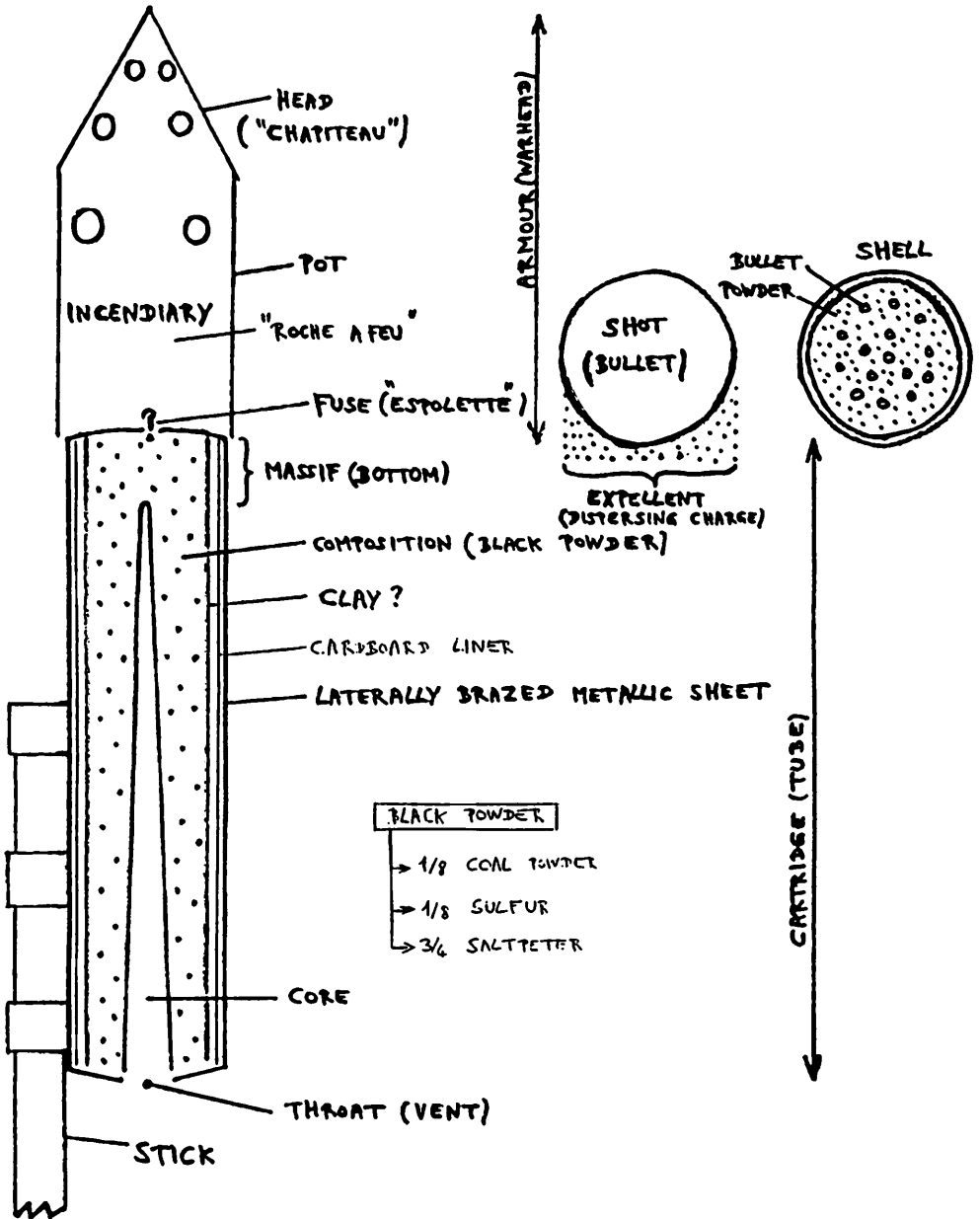


Figure 16 Main principles of an early 19th century rocket.

Research has found where Congreve lived, in the company of at least one other British family (Hill of Irish origin). It was 24, Place Sainte Scarbes, in a private hotel (i.e. a house rented out to individuals). It is fitting to note that in 1932 this hotel became the property of the Archbishop of Toulouse, which it still is today.

Papers of the time say that when he moved around in Toulouse with his wheel chair, Congreve caused astonishment among the inhabitants.

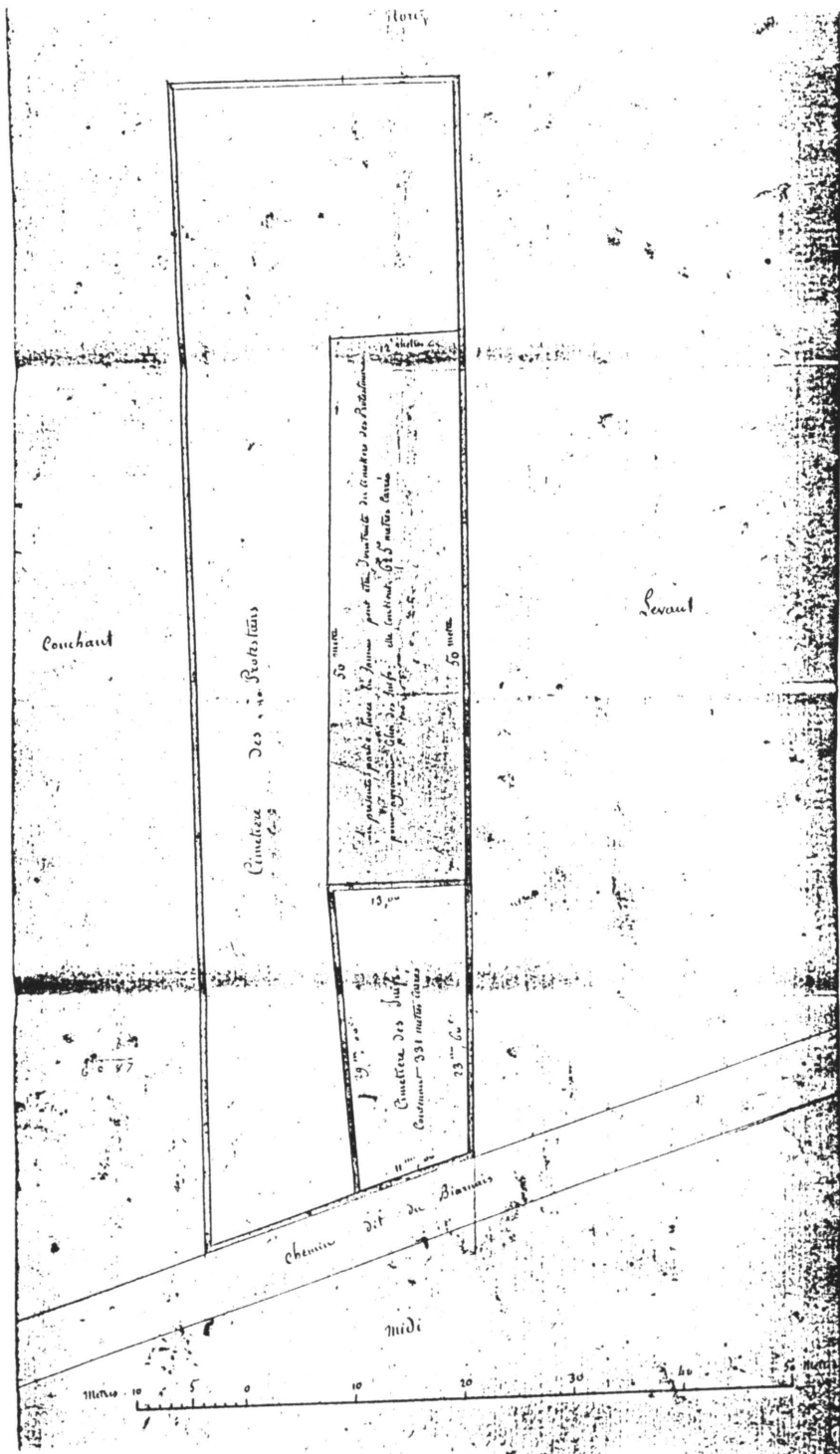


Figure 18 Toulouse Protestant/Jewish cemetery where Congreve was buried.

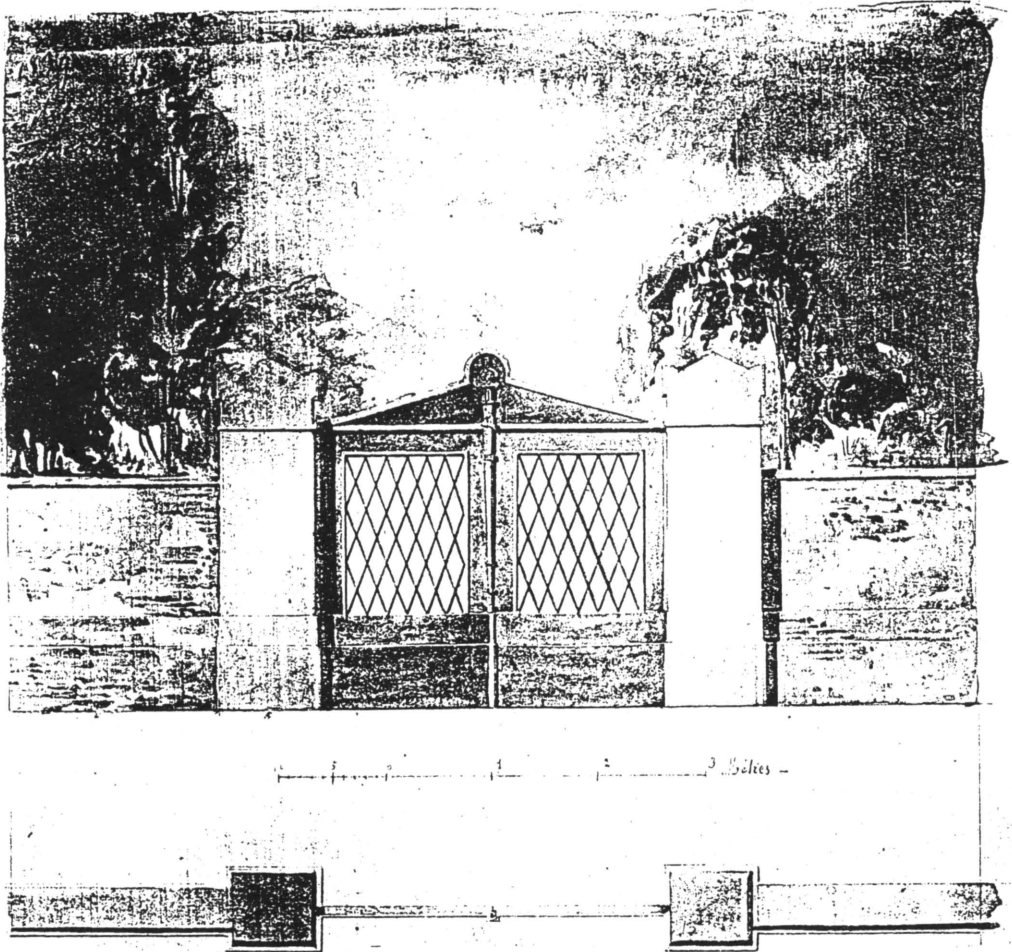


Figure 19 Toulouse Protestant/Jewish cemetery entrance.

Authors' Note

Research on the final resting place of Congreve is still going on to allow the town of the Concorde, Airbus and Hermes to give due credit to the rocket pioneer of the early 19th Century.