

## II

### SECRET WEAPONS OF THE NAPOLEONIC WARS

IT might not be amiss to ask: what is a secret weapon? During the recent war we had all sorts of answers, usually in the form of Nazi threats. A transatlantic rocket would indeed have been a secret weapon, but we were sometimes told that Hitler's secret weapon was hunger, applied to enslaved peoples, and that ours was America's know-how in back-yard mechanics. But a secret weapon should be at least reasonably secret, and something of a surprise to the enemy when it is used, and it should be a weapon.

For the period under discussion, I should like to begin with a few borderline cases. In 1795, an official regulation made lemon juice a regular part of the diet of his Majesty's sailors. It was about time, incidentally, since the virtues of the citrus fruits in combating scurvy had been known, to some at least, since the days of Elizabeth. Edward Jenner's smallpox vaccination, first convincingly demonstrated in 1796, was soon put into the regulations as something constantly to be recommended by military surgeons, although no one was to be vaccinated *against his will*. No doubt the British armed forces benefited from these measures, and earlier than the men of other countries, but no effort was made to keep the discoveries from becoming common property, and they can hardly be called secret weapons.

Toward the end of the Napoleonic War a British naval architect designed a fighting ship with a rounded instead of a

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square stern. The idea was at once taken up, since it made a stronger and more seaworthy ship and permitted the mounting of additional guns. This, however, comes under the head of minor improvements, of which there were many, and in all navies.

In gunnery there were some changes, one especially which shows an interesting tendency and should be noticed. During the War of the American Revolution, a new gun, called the carronade because it was first manufactured in quantity at the Carron Iron Works in Scotland, was adopted by the Royal Navy. It hardly came into its own until the Napoleonic Wars. Like the others, it was a muzzle-loading smooth-bore and was made in the standard calibres. It was, however, much lighter in weight and shorter in the barrel—say one ton against three, and four feet against ten, in comparison with one of the big fellows throwing a shot of the same size.

This meant, of course, that the carronade was useless at long range and required a reduced charge of powder, but at close quarters it was very effective. It was popular on small ships, where maximum firepower with minimum weight was wanted. During the war with Napoleon it became increasingly customary to substitute carronades of large calibre for the standard guns of small calibre which all ships, even the largest, necessarily carried on their upper decks. This simplified the supply problem because fewer sizes of ammunition had to be provided.

It was Napoleon, in one of those flashes of naval intuition which he occasionally showed, who tried to carry this anticipation of the all-big-gun principle to its logical conclusion. Early in 1805 he wrote to his Minister of Marine: "I have several times spoken of my project of arming ships of the line with guns of the same calibre." Accordingly, only 36-pounder guns and 36-pounder carronades were to be retained. "In this

war," continued the artillerist-emperor, "the English have been the first to use carronades, and everywhere they have done us great harm." But the problem was to get the weapons, though they were no longer secret, and here Napoleon could not work a miracle. He tried to expedite matters in order after order. For example: "For God's sake, ship me some carronades. . . . The English, without saying a word, have practised this method. Here's ten years we are behind their Admiralty. . . . I see no attention being paid to it." Here was the all-big-gun principle, exploited by the British and envied by the French, an anticipation of some of the arguments used a hundred years later by Admirals Sims and Fisher. Not entirely the same, of course, for the modern Dreadnought and her progeny are armed not only on the all-big-gun but also on the few-big-gun principle, and no one then proposed the use of a few monster guns only. But it was a great day for some people; as one old sea-dog, Admiral Howe, said, "Happy are those who have shares in the Carron Company."

The examples which I have mentioned are not true secret weapons, but the inventors were busy. It must have been a difficult time for those in the top positions, for under the stimulus of war, bright-minded people bombarded them from arm-chairs and other points of vantage with strategical plans, gadgets, and all sorts of devices for achieving victory. I have seen the correspondence of the British Admiralty for only the year 1806, but there is no reason to think that it was different in any other year, or that the French mind was less active. For example, a sampling of the mailbag for a period of a few months will show something like this: a shallow draft landing barge; a new type of block for the rigging; a project for dismembering the Spanish empire in South America; a new type of gun carriage; how to beat a big ship, using only

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small craft; a simplified code of flag signals and semaphore telegraph; a new cipher; a chemical solution for treating iron to prevent rust; proposals for a new naval academy; a steamship, which could be loaded with explosives and directed against the enemy without having anyone on board; a new type of frigate; a new method of finding longitude; and a project for filling ships with stone and sinking them in French harbors. The worried gentlemen at the Admiralty, not accustomed to dealing with such matters, had to find what was useful in all this and filter out the nuts. How the job was done, in the case of a few famous inventions, should next occupy our attention; though to set the stage, it is necessary to glance briefly at the international situation as it existed in 1803, when, after a short and uneasy truce, Britain and France renewed their struggle.

By this time Napoleon knew very well who his chief antagonist was and that he would have to deal with her directly. With a good telescope one could see the tents of the French troops camped on the opposite side of the Channel, waiting for their opportunity to invade. Landing craft were built inland, then sent down the rivers and along the coast to the assembly points, under the protection of many batteries. The word went out that 150,000 men, a force larger than Britain's regular army, could be embarked on these craft in two hours, to be landed on the coast of England any dark night when the wind was favorable.

On both sides of the Channel, people who would nowadays make a good living from the comic books foretold wonders that were to supplement the usual means of making war. A tunnel was to be dug under the Channel, to be driven through just when a French assault force in balloons drifted across to secure a beach-head. Englishmen armed with pistols and held aloft by large kites were to contest the landing of this air-

borne force. Or, to outfight the British vessels, great rafts, with citadels mounting hundreds of guns, were to bring the army across, their motive power supplied by windmills harnessed to paddle wheels.

One may be sure that such schemes were far from Napoleon's mind, but there can be no doubt that he seriously intended to stage an invasion. Some question has, indeed, been raised as to whether he really meant business; it has been shown, for instance, that instead of 150,000 men embarked in two hours, his utmost effort could have put 90,000 men afloat in eighteen, taking advantage of two high tides. His units were not at full strength and his harbors silted up; he himself said later, on thinking it over, that he really intended to crush the Austrians and the Russians and that the great force necessary for this plan could best be assembled at the Channel, so that the intended victims would not be forewarned.

The invasion publicity contained two striking pieces of evidence which are not, in themselves, entirely conclusive: one is the medal, ostensibly struck at London, which was made to commemorate the invasion, and the other the great 175-foot marble column, called the *Colonne de la Grande Armée*, which was raised near the coast a few miles from Boulogne. This shaft was topped by a statue of the Emperor, and I am reliably informed that he points across the sea toward England, above the inscription, "*Voilà l'ennemi!*"—"*There is the enemy!*" At least he did stand thus, but in August, 1914, when the adjoining area was turned into a base camp for the British Expeditionary Force, the Curators of National Monuments had a twinge of embarrassment when they realized the unfriendliness of this gesture. With truly Gallic ingenuity and courtesy, and the help of a couple of steplejacks, they faced the Little Corporal to the right,

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where he pointed now to the advancing Germans—"Voilà l'ennemi!" I dare say Hitler had him turned back again. This story certainly ought to be true, and the column certainly was built.

If Napoleon's campaign was a feint, it was a good one, and no government in its senses could afford to ignore the threat. The British army and militia were increased, and to these were added, in a year's time, a home guard of 350,000 volunteers. Strong points called Martello towers were built all along the threatened coast; the idea and the name seem to have come from a place called Mortella in Corsica, where there was a tower which had given Hood and Nelson a lot of trouble in their operations against the island in 1794. Work was also pushed on a big ditch, called the Hythe Military Canal. There were not lacking those who ridiculed the ditch which was supposed to stop the French after they had already crossed a much bigger one, but it was, of course, intended to plug a vulnerable gap and slow up the invaders long enough for the home guard to rally, just as the towers were supposed to impede progress from the beach. Part of the home guard, living in the ports, called themselves the Sea Fencibles and were to man various small gunboats in case of attack. While always professing themselves ready to spring into the breach, they never allowed the call of duty to interfere with their private pursuits. The Royal Navy perforce had to allow them to exist, but never placed tuppence worth of reliance upon them.

The Navy felt that it had the situation well in hand. It resisted the usual outcry to have a battleship anchored off each port and beach, and set up its defenses with a few ships of force, called block ships, assigned to certain in-shore stations. The Channel was patrolled by squadrons of sloops and frigates, entirely adequate to cope with French invasion barges.

The real defence, as well as the real danger, came from the big ships, which seldom saw the shores of England. Napoleon's plan evolved into one of decoying away the British ships of the line blockading his harbors, and then getting into the Channel with a real battle fleet for long enough to cover the crossing. It was this elaborately worked-out plan, which was actually attempted, which I think proves that Napoleon was deadly serious about the invasion. Hard work and alertness frustrated the plan, and the shores of England were defended far from home by those "distant, storm-beaten ships, upon which the Grand Army [of Napoleon] never looked" to use Admiral Mahan's fine phrase.

But you never could tell, and the minds of many turned to novel ways of outwitting the enemy. Opportunity had knocked first for the French in the person of Robert Fulton, one of those international Americans of the period who was, like Samuel F. B. Morse, a painter turned inventor. In 1800, mostly on his own, Fulton produced in France a submarine which could dive, and, with the aid of a two-man power motor, proceed under water. It was literally two-man power, since two intrepid volunteers turned a crank which drove the propeller. Armed with an official letter, stating that he was acting under government orders and was not, if captured, to be treated as a pirate—on pain of reprisals—he started out one day to show them and gallantly but harmlessly pursued a couple of English brigs which had ventured close to shore. The idea was to attach mines to the bottoms of the enemy's ships, but his little boat never had a chance.

Fulton also built a steamboat, in 1803, which moved upstream in the Seine "at the pace of a rapid pedestrian." It sank one night at its dock, and the incident quite unjustly caused a loss of public confidence. It should be emphasized that the steamboat in itself was potentially a revolutionary

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weapon of war, because it could move in a calm which would then stop even the biggest warship. Fulton was the first to perceive its possibilities in warfare, though he was not in this case, nor in that of the submarine, the first inventor in the field.

Napoleon's attitude toward Fulton's offerings is obscure. Following the first submarine experiments, Fulton submitted a plan for crossing the channel in a submarine and laying mines in English harbors. The First Consul wanted to see the submarine and was informed that it had been scrapped; a new and better one would be forthcoming, however, in return for a satisfactory financial arrangement; Napoleon's comment was that Fulton was a charlatan and a swindler who wished solely to make money. Fulton was not imprisoned and tortured, showing that Napoleon had much to learn in order to become a full-fledged dictator.

Napoleon was equally skeptical two years later, in 1803, on being offered a prospectus for a steamboat to tow troop barges to England. Napoleon always showed an aversion to long-hairs, whom he called ideologues, and apparently to inventors as well. "Bah!" he said, "these projectors are all either intriguers or visionaries. Don't trouble me about the business." But a year later, in July 1804, faced with the practical difficulties of his undertaking, the reaction was quite different. By some chance Fulton's steamboat scheme was resubmitted to Napoleon, who immediately wrote to the head of his Marine Department: "I have just read the project of Citizen Fulton, which you have sent me much too late, since it is one that may change the face of the world. . . . I desire that you immediately confide its examination to a Commission. . . . A great truth, a physical, palpable truth is before my eyes. It will be for these gentlemen to try and seize it and see it. . . . Try to let the whole be concluded within 8 days, as I am impatient."



But Citizen Fulton was not to be found; under the name of Mr. Francis, he had reached London two months before. This change of sides, for which no blame can be attached to Fulton, had been engineered by Fulton's friend the Earl of Stanhope. The Earl was an inventor, too; he had designed a steamboat that did not run, and a printing press that did; he took his friend seriously enough so that he produced a mine-sweeping device to take up Fulton's mines.

Fulton's proposals, for which he soon received substantial government backing, went much further than the manufacture of isolated novelties. He had a Submarine System (with capital letters), a plan for organizing special squadrons and taking the offensive in a new way. This appealed to William Pitt, who was unquestionably seeking means of changing over from the purely defensive; it would be a mistake to think of Britain's leaders at this time as merely wondering what the French would do next.

Fulton's system comprised explosive infernal machines and the means of taking them to their targets. An improved submarine would be best, he thought, but when this failed of approval he was willing to compromise on ordinary surface craft. The weapons were what we should call mines, but which were then referred to as submarine bombs, torpedoes, coffers, or carcasses. These were to be of two main types: one, lighter than water, to be anchored beneath the surface in enemy harbors and to explode on contact; the other, slightly heavier than water and buoyed by a cork float, was to be attached by a line to the anchor cable of an enemy ship. The tide or current would then carry the mine under the ship's bottom, where a clock-work mechanism, previously set, would cause the explosion.

These ingenious plans did not escape the adverse criticism of some who learned of them. Some, who were afraid that

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Fulton really had something, said that Britain should not sponsor inventions which might recoil upon her, and those who had no faith said the whole thing was foolishness. No one apparently said anything about the ethics of the new method. Fulton repeatedly claimed that his system would mean the obsolescence of all fleets as they were then constituted. When old Earl St. Vincent, the greatest administrative admiral of his day, heard what was going forward "he reflected for some time and then said Pitt was the greatest fool that ever existed, to encourage a mode of war which they who commanded the seas did not want and which, if successful, would deprive them of it."

The statement sometimes made that the British were more interested in getting Fulton away from the French than in backing his inventions is without foundation, although Fulton sometimes complained of financial undernourishment. Actually there were at least seven attempts made in 1804 and 1805 to use the new weapons, some on a large scale, some on individual forays against a single ship. The large-scale attacks were invariably carried out in such a way that all advantage of surprise was lost, and, also invariably, they were carried out with great dash and daring. The net result was nil, except to teach the French to keep their eyes open.

The original mines were copper spheres, but in the second large attack a new type, called the coffer, was used. This was a great watertight box, 21 feet long, filled with 40 barrels of gunpowder, and weighted so that it floated barely awash. To get them in, catamarans were used; copied from native craft in Indian waters, these were simply two large 9 by 9 timbers, about 10 feet long, held parallel by struts. A sailor, wearing a black jersey and with his face covered by a black mask of the sort now favored by professional wrestlers, sat half immersed amidships and sculled the thing along. It was sup-

posed to be practically invisible, and the job of the operator was that already indicated: to attach his coffer, pull out a pin actuating the clock-work detonator, paddle away and let the tide do the rest. Despite the improbable sound of all this, such an attack was actually carried out on one occasion. There were terrific explosions, but no damage was done and the Frenchmen were left with some interesting trophies. Apparently Fulton had forgotten that a small explosion under water would be more effective than a big one on the surface.

Something was always getting fouled up. On two occasions when boats' crews dropped pairs of torpedoes perfectly, again with no effective result, Fulton explained that the French ships "owed their safety to the trifling circumstance of the torpedoes not being properly balanced when in water, and the coupling lines not being tied to a bridle, so as to make the torpedoes sheer under the bottoms of the brigs." But trifling circumstances seemed more than trifling to the men who had risked their lives.

Once the attacks started, there could be no more secrecy about the general features of the plan, and there was further talk about foolish novelties. Mr. William Cobbett, who was against the administration and a number of other things as well, put a poem in his *Political Register*. The people mentioned in it, aside from that familiar nautical character, Jack Tar or Tarpaulin, are civilian members of the Cabinet in 1804, notably the Scotsman Henry Dundas, who was Viscount Melville and for a short time First Lord of the Admiralty; the following are a few stanzas:

Dundas is gone to Boulogne;  
He has a pawky plan  
To burn the French flotilla  
'Tis called Catamaran.

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'Like ladies in romances  
Their knights' exploits to spy  
Aloft in Walmer Castle  
Stand Pitt and Harrowby.

Dundas our tars haranguing  
Now shows his new-made wares.  
As at some peddler prating,  
Jack turns his head and swears.

. . . .

Your project new? Jack utters;  
Avast; 'Tis very stale;  
'Tis catching birds, landlubbers,  
By salt upon the tail!

Pitt and the others are excitedly watching the fireworks:

There in the blaze go fifty!  
And there go fifty more!  
A hundred in disorder  
There run upon the shore!

The light of dawn, however, reveals that "the French are laying, just where before they lay." And, in conclusion:

May Pitt from Colonelling  
Retire upon half pay  
And Admiral Lord Melville  
The yellow flag display!

(The yellow flag carried none of its modern connotations; it was simply a figurative way of indicating retirement.)

In truth there were faults on all sides, and in 1806, after an acrimonious dispute about money, Fulton departed for the United States. He had what he most wanted, an export license for a Watt and Bolton engine, an engine which in the

next year drove the famous North River Steamboat, usually, but less accurately, called the *Clermont*.

Fulton was a man of enormous energy and capacity, and naturally he tried to interest his own government in the ideas which, he felt, had received less than their due in England. He had prophesied that Britain would see the day when the Thames mouth would be blocked with mines, and the Channel, too, with a barrage of mines from shore to shore. He was too early by a hundred years or so, but this does not detract from his abilities. He had also pointed out to the British government "the bad policy of forcing me into a position where I must apply them (my engines) to the total subjugation of this country." This kind of utterance had not won him many friends. Now the state of tension between Britain and the United States gave him the chance to show what he could do.

He was willing enough, but the United States government adopted essentially the same attitude as that of His Britannic Majesty. Jefferson, no mean inventor in his own right, was interested, and eventually Fulton got \$500 and the hulk of an old ship to practise on. Spectators were invited, and on the third trial the hulk was blown up, but no one was much impressed. Washington Irving paid his respects to the new warfare in the thirteenth issue of *Salmagundi*:

[It is] an excellent plan of defense . . . no need of batteries, forts, frigates and gunboats: observe, sir, all that's necessary is that the ship must come to anchor in a convenient place—watch must be asleep, or so complacent as not to disturb the boats paddling around them—fair wind and no tide—no moonlight—machines well directed—mustn't flash in the pan—bang's the word, and the vessel's blown up in a moment!

Fulton was busy with steamboats, but he stopped long enough in 1810 to present each member of Congress with a pamphlet entitled "Torpedo War & Submarine Explosions."

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But it was the same old story—no real interest, no money, many scoffers, and several determined enemies of the invention. Nevertheless, Fulton inspired many followers, and the War of 1812 abounds in minor episodes of men with more daring than skill bobbing about in home-made submersibles and other craft, trying to blow up the British blockaders. Since at the moment they had none of these devices themselves, the British naturally denounced the whole thing as piracy.

Fulton's last invention was the first steam warship ever to get under weigh, a strange vessel with thick sides and paddles well protected between a double hull, an anticipation of the iron-clad. Besides other weapons, she carried a huge hose worked by a steam pump, designed to wash the enemy's sailors off his decks and dampen his guns. Rumor crossed the Atlantic more quickly than this *Demologos*, or *Peoples' Voice*, as she was called, could be built; it was reliably reported that her sides were 13 feet thick, with other dimensions beyond anything ever known (actually she was rather small); that she could discharge 100 gallons of boiling water per minute to repel boarders and that she was fitted with a mechanism to brandish 300 cutlasses over the side at 15-second intervals. On hearing all this the British staged a commando raid to seize Fulton in his bed, but he was luckily delayed that night and was not at home. Unfortunately for the romance of invention, the war ended before the new monster of the deep was fitted with her engines. She later moved, but not in anger, and Fulton, who died just after the peace treaty was signed, was not there to see her. But he died successful, for he took the steamship out of the curiosity class.

The last British attempt, late in November, 1805, to use Fulton's mine-torpedoes was a full-dress affair. It failed because of bad weather, and the season was too far advanced for a further effort, but it marked also the first use in modern

warfare of another very secret weapon, the rocket. The year before, a certain William Congreve (not the playwright), taking an idea from native warfare in India, had received government encouragement to carry out some experiments. He was the son of the Comptroller of the Royal Ordnance Laboratory at Woolwich, and no doubt this helped him to get a hearing; he soon had as his backers the Prime Minister, William Pitt, and another redoubtable amateur warrior, Lord Castlereagh, the Secretary of State for War.

Mr. Congreve's weapon was a gigantic skyrocket with a stick 25 feet long, filled with a highly combustible material which is, so far as I know, still secret. A meeting of the brain-trust for the new warfare is thus reported by one veteran admiral to another, Lord Keith to Lord Barham (October 12, 1805). Lord Keith was in command of the Channel forces and was, understandably, feeling a little hurt: "My Lord—I returned from Walmer this morning, where I met Lord Castlereagh, Mr. Pitt, Sir Sidney Smith, Mr. Francis, and Mr. Congreve. The plans seem determined upon, and I was only asked about the means of putting them into execution. Sir Sidney seemed to have only one wish, which is to get all the force in this coast put under his direction, to create an eclat in the papers; Mr. Francis is full of coffers, carcasses, and submarine boats, which will not answer here; and Mr. Congreve, who is ingenious, is wholly wrapt up in rockets from which I expect little success, for Mr. Congreve has no idea of the means of applying them professionally."

Sir Sidney Smith, whose career reads like a particularly exciting novel about Mr. Forester's hero Captain Hornblower, was the officer in immediate charge of the project. He was far too brilliant a man to be left out of things and far too sure of himself to have many well-wishers. The new warfare was made to order for him.

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Even while Sir Sidney's forces were moving out for the big attempt, on the night of November 17, Lord Barham, eighty-year-old, First Lord of the Admiralty and still a doughty fighter, was writing to give Mr. Pitt the facts of naval warfare as he saw them. He pointed out that ships were escaping from Dutch harbors, with more certain to follow, and all because a third of the Channel forces have been waiting on Sir Sidney Smith. "Much as I condemn this romantic kind of warfare," he said, "I have suppressed my sentiments because you and Lord Castlereagh take so great a share in it"; but now that he sees the enemy enjoying himself, he can keep silent no longer.

Sir Sidney reported from mid-channel that Congreve was having trouble, in a heavy sea, with his rocket frames and with his willing but green assistants; "we can but try," he concluded. They did try, but the waves were too high for the attack to be pressed home; the coffer-mines floated in all directions; the rockets flared without taking off or perversely headed back toward England. It was a fiasco, and Lord Keith besought Lord Barham to call off the amateurs. "Interpose your professional experience with the protectors of these projects," he wrote, "and they will abandon them; for the authors of them never will, so long as they are maintained luxuriously at the public expense."

Nevertheless Mr. Pitt still believed in the rocket, and the next year, 1806, Congreve came up with an improved version. The stick was reduced to 15 feet; the body was of iron instead of paper; the range was upwards of 3000 yards; some rockets were incendiaries only, while others were headed with 6- and 12-pound spherical shells filled with musket balls "to burst in the air on Colonel Shrapnel's principle."

Congreve was obviously nervous about his brain-child and bombarded the new First Lord, Thomas Grenville, with let-



ters about its advantages. Since the rocket had no recoil, any vessel was capable of launching it; a small craft might thus have great firepower, and the massing of such ships for one almost simultaneous discharge would achieve surprise and necessarily produce a cumulative effect, with greater safety for the users. In every way it compared favorably with its rival, the mortar shell; it was cheaper per unit, and far cheaper if all the mountings were taken into account. It had been objected that the enemy would simply extinguish or drag away the incendiary rockets, but to discourage such a practise an explosive charge had been included in a certain number of them.

On October 9, 1806, Commodore Owen gave Boulogne a rocket treatment; Congreve reported that 400 rockets had been discharged in half an hour and great damage inflicted, particularly on that part of the town where the naval storehouses were. This estimate was reduced by the Commodore to read 200 rockets, most of which were caught in a cross wind and carried off line; the town and shipping still seemed to be in good condition. As Owen reported: "I must add I felt extreme vexation that Mr. Congreve suffered himself to be carried away by his sanguine feelings. . . . It is of this sanguine disposition I have always had more fear than I had of danger in the execution of the project."

A few months later a ship full of rocket equipment was sent out to Admiral Collingwood off Cadiz, for use in Admiral Duckworth's expedition against Constantinople. Collingwood did not refer to the invention as "Mr. Congreve's squibs," as some had done, but when he had looked them over he felt grave doubts about their accuracy, although he hopefully reported "if the ships lie very close at Constantinople, chance may supply the place of accuracy." This was something of a contradiction to the instructions sent by

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Grenville, who had said: "I trust you will feel with me the propriety of restraining the use of these destructive machines entirely against armed shipping or military or naval preparations, because the mere burning of a town or village is a species of warfare which is not worthy of, or fit for, the spirit of our service." The rockets were too late for Constantinople, but the spirit of the service was not so squeamish later in the year at Copenhagen, where the city was certainly burnt, with the rocket men claiming the largest share of the credit.

Congreve adapted the rocket for use on land, and the weapon was later sent to the Duke of Wellington in Spain. The Duke, notoriously conservative in all matters of ordnance and, indeed, in all matters, said "I don't want to set fire to any town, and I don't know any other use of rockets." Nevertheless, rockets were used at the Battle of Leipzig in 1813, where they had at least a considerable moral effect, and at Bayonne in February, 1814, they were credited with breaking up a French counter-attack. Later in the same year, as everyone knows, the rockets' red glare lighted up the Stars and Stripes over Fort McHenry.

What the Iron Duke really liked was the bombs bursting in air on Colonel Shrapnel's principle. This projectile—not, of course, a true flat-trajectory shell—was first adopted by the British army in 1803 and later used with great effect in the Spanish Peninsular campaign. Apparently it had an adjustable fuse which was ignited by the firing of the gun. Wellington considered it so important to keep this weapon secret that he asked that all honors and recognition be withheld from its inventor until the end of the war. He wrote, however, many personal letters of commendation, and one of his staff officers added that the increased effectiveness of the artillery had been "complimented both by the French and by our own general officers, in a way highly flattering

to us." Shrapnel shells figured at the Battle of Waterloo and perhaps decisively, for General Wood, who commanded the British artillery, wrote to Shrapnel that his invention had been instrumental in regaining the position of La Haye Sainte, which was the key position of the whole battle. And the ubiquitous Sir Sidney Smith, finding in 1813 that he could not get enough shrapnel shells through official channels, ordered some at his own expense from the Carron factory.

Looking over the field, Napoleon is perhaps more to be criticized than the British for failing to go all out for secret weapons, since by such means the great naval disparity might have been equalized. But the truth is that the time had not quite come. What we have here is the beginning of the mechanical part of the industrial revolution as applied to warfare. The day was dawning for the great applied inventions—steam, armor, rifled ordnance, shell, real submarines and real torpedoes, but even the stimulus of a twenty years' war, though it could force the seed, could not bring about any real growth.

Great Britain could have won the war without secret weapons—indeed, she did win the war without secret weapons. No one can maintain that torpedo-mines or rockets or shrapnel in themselves turned the tide. Britain won because she never imagined that she could be defeated and because she never gave up trying. Further, she never gave up thinking. Besides the military genius of the enemy, there were mistakes and stupidity fit to take the heart out of the country, but even these obstacles were surmounted.

It is perhaps along such a line that the significance of the secret weapons lies. It is true that they were indecisive, so far as the over-all course of the war was concerned, and that they were generally ill-supported—no billion dollars was expended on any one of them. They were usually employed in scanty

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numbers, without the benefit of surprise, and often under adverse conditions. Their proponents, though in high places, were amateurs and easy marks for the critics. The parallel comes to mind of Winston Churchill and his tanks, a tremendous weapon put through in the face of all sorts of opposition and then employed in small numbers, in a local operation, in the late autumn of 1916, when success was improbable and exploitation impossible.

In the old days professional men mistrusted the mad geniuses, sometimes leaving off the geniuses, and the civilians who backed them. Nowadays this has all been changed and nothing shows more clearly the progress of applied science in the last hundred years than the respect shown to OSRD, NDRC, and other mysterious sources of national power.

But however mistrusted and misemployed, the work of the pioneer inventors in Napoleonic days shows an intelligent and aggressive spirit at work. It was vitally necessary for Britain to regain the offensive—not merely to stave off defeat each year. William Pitt tried hard; he backed the secret weapons; and it was not his fault that the coalition of 1806 did not bring Napoleon down. A lesser man than Napoleon would have fallen, but instead there was the Battle of Austerlitz. Even with danger threatening at home, forces despatched by Pitt occupied South Italy and Sicily, and the Cape of Good Hope: thus the outer lines were held and communications secured. Pitt died of disappointment and cirrhosis of the liver in 1807, but there were others to carry on.

At first they failed, and kept on failing. Sir John Duckworth was sent to bring the Turks into line in 1807, an expedition not at all unlike the famous Dardanelles campaign of 1915. Both were good ideas, to begin with; both carried the same potential benefits of taking Turkey out of the enemy camp and bolstering the Russians; both failed because the com-

mander on the spot lacked the determination to see the thing through.

A big combined operation was mounted in 1809 to capture the vital port of Antwerp. It had Sir Richard Strachan as its admiral and the Earl of Chatham, Pitt's elder brother, as its general. It got ashore but never got near Antwerp. It is a long and a sad story but it may be summarized in a bit of doggerel much quoted in London after the return of the expedition:

Great Chatham, with his sabre drawn,  
 Stood waiting for Sir Richard Strachan;  
 Sir Richard, longing to be at 'em,  
 Stood waiting for the Earl of Chatham.

But the search for the offensive had already given Wellington his beach-head in Portugal. He was almost pushed into the sea, but he had the famous defenses of Torres Vedras ready—in themselves a secret of sorts, for his adversary was unpleasantly surprised when he saw them. This time there was no fiasco. When Wellington counter-attacked he still had a long road to travel, but the defensive part of the war was definitely past.

HARDIN CRAIG, JR.

#### NOTE

The author wishes to express his very great debt to the following works, from which he has drawn much of his material: Corbett, Julian S., *The Campaign of Trafalgar* (London, 1910); Flexner, James Thomas, *Steamboats Come True: American Inventors in Action* (New York, 1944); Laughton, J. K., ed., *Letters and Papers of Charles, Lord Barham, 1758-1813* (Navy Records Society, London, 1907-8); and also to a most scholarly and enjoyable series of articles in the *United States Naval Institute Proceedings*: Knox, Dudley W., "Early Naval Use of Rocket Weapons" (Feb., 1946); Thomson, David Whittet, "The Catamaran Expeditions" (Feb., 1944) and "Robert Fulton's 'Torpedo System' in the War of 1812" (Sept., 1946). The only sources not in published form are the Admiralty Papers (Stowe MSS.) in the Huntington Library, San Marino, California, from which several references and quotations, particularly those relating to William Congreve, are taken.