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The Man Huntington Loved to Hate

A Paper for the Sphex Club

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When I first began to study physics, about a half-century ago, I learned it the "old fashioned way." The teacher presented the theory and I learned to apply that theory by solving problems which he set. I was both impressed and attracted by the neatness of the theory and the power of its application. I attended college and decided to pursue physics as a career and thus began to study these powerful ideas in greater depth. As I learned more, I realized that the smooth and logical path described in the elementary textbook did not in any way represent the real manner by which physicists and other scientists came to believe what they believe about nature. The many tortured, incorrect or inadequate false starts were missing as were the experimental data underlying the current state of various theories. One small example: most of you believe that, contrary to our experience, the earth orbits the sun. Can you cite one conclusive piece of evidence which proves that to be the case? As I began to teach, I decided that students ought to realize that real science is a human endeavor, subject to all of the human frailties, so I have worked to incorporate the history of my discipline into my classrooms. One of my earliest fascinations has been with a fascinating, though obscure, individual, who merits only a footnote in modern texts. I think I can convince you that he was much more important than a footnote would imply.

In Munich, prominently displayed on the Maximillianstrasse in front of the Bavarian National Museum, stand four larger-than-life statues, two on either side of the street. Three are dedicated to German heroes; one to an American. This unique memorial was erected by Maximilian II, King of Bavaria, in recognition of the public services on one Graf von Rumford. Rumford was an American backwoodsman who rose to become a Knight of the British Empire, a Count of the Holy Roman Empire, a Fellow in the Royal Society of London and a Fellow of the Institute of France. George III hated him, but used him. The Elector of Bavaria enobled him, and Napoleon admired him. This now little known man was at one time or another a medical student, a school teacher, a cavalry officer, a civil servant, a creative scientist, a tireless inventor, and even a de facto dictator--all due to the power of his own genius and his compelling personality. What follows is based primarily on the work of his primary biographer, Professor Sanborn Brown of MIT.

Benjamin Thompson was born in Woburn, Massachusetts (today a northern suburb of

Boston) on March 26, 1753, to an ordinary farm family. His father died when he was quite young and he was indentured at the age of 13 to a dry goods importer in Salem. The importer's resistance to the Stamp Act was so harmful to his business that young Benjamin was released after only three years' service. He soon found employment in a dry goods shop in Boston, located in a building which still stands near Fanueil Hall. In the time between leaving Salem and coming to Boston, he wrote a letter to Benjamin Franklin, asking "Please to give the Nature, Essence, Beginning of Existence, and Rise of the Wind in General--with the whole Theory thereof, so as to be Able to Answer all Questions relative thereto." Another request sought "Please to inform me in what manner fire operates upon Clay, to Change the Colour to red and from red to Black . . . and how it operated upon Silver to Change it to Blue."

We know much about his life at this period both because he kept a detailed diary and because he wrote many letters to an older friend, Loammi Baldwin, who shared his fascination with science and natural philosophy and whose letters and papers are archived in the University of Michigan library. He was fired from the dry goods business after a year or so, because, apparently, he caused a major explosion in the shop in the process of designing a rocket to celebrate the repeal of the Stamp Act. Whatever the reason, he then became an apprentice to the local physician in Woburn. His previous employer wrote to his mother that he "oftener found her son under the counter. . .constructing some little machine or looking over some book of science, than behind it arranging the cloths or waiting on customers." While he did not take to medicine, he did continue his scientific pursuits, submitting a paper with detailed drawings of an abnormal child to the American Philosophical Society. He taught school for several weeks at a time and continued his experiments. None of these occupations appealed to Thompson. So, early in 1772, he left Woburn to teach school in Bradford, Massachusetts. While there he began to study science under guidance of the Reverend Samuel Williams, who later would become Hollis Professor of Mathematics and Natural Philosophy at Harvard College. Not satisfied with this teaching post, he moved to Concord (originally Rumford), New Hampshire. He had been invited by the Reverend Timothy Walker, formerly of Woburn, to help set up and teach in a school there. As was customary for teachers in colonial days, he lived in his sponsor's home.

Within a few months, the young man had courted and wed the pastor's daughter, a widow eleven years his senior and the richest landowner in Concord. He immediately owned two thirds of the land in town. He gave up teaching as a career to assume the role of a gentleman. When later teased about marrying a rich widow eleven years his senior, the handsome young man would retort that "She married me, not I her." Also, as he would prove to do many times in the future, he set about making himself useful to the Royal Governor, John Wentworth. He proposed a scientific survey of the White Mountains and also began, as he would so often do, a systematic study of agriculture, writing to Loammi Baldwin requesting an extraordinary variety of seeds for spring planting. Within six months of his marriage, the governor had made Thompson a major in the state militia. He was 19 years old. Within a few years, however, his fortunes changed dramatically. His aristocratic pretensions fueled a well-founded suspicion that he supported the British cause. On being warned of his impending capture by local patriots, he abruptly galloped away in the middle of the night on his brother-in-law's best horse to escape being tarred, feathered, and run out of town on a rail. Soon afterwards he joined the Loyalists in Boston to serve as a spy and informant for the British army.

In early May of 1775, Thompson wrote a letter, with a substantial text in invisible ink that warned Gen. Gage, besieged in Boston, that "the four New England governments" would feint an attack on the city to seize its castle, critical as a staging area for royalist raids on provincial magazines. This message is the earliest of the period to use gallo-tannic acid (which could be developed in an iron sulfate solution).

George III had replaced the Royal Governor of Massachusetts in 1774 with a military government in an attempt to control the Province's alarming disaffection with royal rule. The imposition of martial law under Gen. Thomas Gage that year led directly to the Siege of Boston which broke out in 1775 with the Battles of Concord, Lexington, and Bunker Hill. The Americans lay siege to Boston for yet another year. One of the most detailed pictures we have of the American Army during the Revolution comes from a memorandum written by Thompson in 1775, entitled "Miscellaneous Observations Upon the State of the Rebel Army.

The British held out for two years, partly by cutting a short channel to open water and by surrounding the city with espionage rings. These rings were directed by a Dr. Benjamin Church, Jr, whose principal aide was one Benjamin Thompson, former farm boy. Thompson's original assignment was to act as courier to Dr. Church, often referred to in the same breath as Benedict Arnold where treachery is concerned. Apparently the young man spent much of his time in Cambridge. Here, in 1775, Isaiah Thomas, the printer of The Massachusetts Spy which helped promote the revolution, sued his wife for divorce, naming Thompson as correspondent! He later claimed to have attended Harvard College during this period, although Harvard's records do not corroborate the claim.

When Dr. Church was betrayed by his mistress, Thompson escaped to Boston by going 60 miles to Newport in Rhode Island, then sailing back to Boston through the safety of the

British blockade. When Boston fell, Gen. Howe sailed for Halifax with his troops and more than a thousand Loyalists, Thompson among them. Thomson then sailed for Britain with an introduction from Gen. Gage, and immediately reported to Lord George Germain, Secretary of State for the Colonies.

Lord Germain had been humiliated during the conflict between George II and George III. In what is known as the Minden Affair, he had been exploited and betrayed. Seeking revenge and vindication, he had risen from the ashes, largely by constructing a vast espionage circle in the form of rings within rings within rings. The Boston rings were part of his plot. Germain could stoop to anything; and Thompson was more than a match for him. According to Thompson's principal biographer, Sanborn Brown, "... on more than one occasion Thompson's name was associated with Germain's' ..." in regard to charges of sodomy. While I will not belabor the point, it would not be the last time in Thompson's life that such accusations were to arise.

For whatever reason, Thompson rose very rapidly in the service of the British government. During this period he found time to carry out a scientific investigation of the force of fired gunpowder and to develop a new system of marine signaling for the British navy. In 1781 he published a paper--his first of a scientific nature--on the force of gunpowder, before the Royal Society of London, of which he subsequently become a fellow and who awarded him the prestigious Copley medal for his researches..

During his tenure as Under Secretary of State for the Colonies, Thompson committed two despicable acts (and probably more we know nothing about). First he arranged the arrest and detention of John Trumbull, the painter, son of a Governor of Connecticut and an aide-de-camp to George Washington) despite his having been granted immunity to study with Benjamin West. Second, he permitted the torture of Henry Laurens who had been intercepted on his way to negotiate a vital loan for the States from the Dutch traders who had ensured the success of the revolution by supplying ammunition.

The LaMotte spy case was one of London's most well-known spy incidents during the Revolution. LaMotte was accused of spying for the French after being betrayed by one of his fellow conspirators. He was caught red-handed with detailed information on naval operations and maneuvers. The source of his information was never divulged. Gossips pointed their fingers at Benjamin Thompson. LaMotte was drawn and quartered, and Thompson abruptly resigned his post and left for America to raise his own regiment - under no less than Lord Germain's worst enemy, Sir Henry Clinton!

This attempt was speculation in its purest form. Thompson obtained a royal charter to raise a regiment (of colonists) at no cost to the British government. The size of the unit determined the rank which the organizer could demand. The payoff was that when the regiment was no longer of use to the crown, the officers would keep their ranks and receive a pension of half pay for life.

He was to recruit and train a regiment of 366 enlisted men who were not otherwise in service to the king. Each recruit would receive a three guinea bounty for enlisting--the only expense paid by the crown. While he had dispatched an aide to recruit in New York, the ship bearing him to America was blown off course and he landed in Charleston. While arranging to get to New York, he served General Leslie, leading foraging raids. Eventually he did make it to New York, where he raised the full regiment and settled down for the winter of 1882-3 in Huntington, Long Island. Stories equating Thompson to the devil incarnate still abound in that small village. He stabled his horses in the village church, razed another church and used its timbers to construct fortifications, and clear cut the apple orchards, even though other wood was readily available. Perhaps the most pernicious act was taking the gravestones from the town cemetery and building baking ovens with them. Soldiers then forced the residents to purchase loaves of bread with the reversed names of loved ones burned into them. Thompson called the ruined cemetary "Fort Golgotha." Thus the "man Huntington loved to hate." He's still featured on the Long Island history website.

Following the surrender at Yorktown, Thompson returned to London where he managed to have the King's American Dragoons transferred to the regular military service. For his service to the crown, he requested that he be made a colonel. King George demurred, stating that the rank of Lieutenant Colonel was quite sufficient, given the circumstances of his service. Three weeks later Thompson was made a colonel and received a lifetime pension on half pay. He then departed for the Continent as a soldier of fortune.

Early in his European travels, he met an elderly lady in Vienna, who, he wrote, "opened my eyes to other kinds of glory than that of victory in battle" Thereafter, according to his journal, he would devote his talents to the well-being of mankind. In Strasbourg, he met the Duc de Deux-Ponts, whose regiment had fought for the Americans, and from whom he obtained an introduction to the Duc's uncle, the Elector of Bavaria, Karl Theodor. In Vienna, he met with the British Ambassador, with whom he made arrangements to pass along interesting information from his travels.

In Munich, he was most warmly received and, after settling down, offered his services as a military aide. The Elector accepted the offer, but to avoid controversy, insisted that Thompson must have the proper social status at the court. He returned to London, where he managed to convince George III to knight him as Sir Benjamin Thompson. One might wonder what arrangements were made to secure this title.

In the beginning of his service in Bavaria, where he held the rank of Colonel in the Bavarian Army, he did make regular reports to the British ambassador in Vienna. As his position in the court became more secure, his urge to succeed in his new surroundings outweighed his propensity for spying and the British government became more and more convinced that he was holding out on them. He proposed to the Elector that he be put in charge of a total reorganization of the Bavarian Army, a group with ill morale and little ability as a fighting force. The stipulation was that his reorganization cost the government no more than they were currently spending and, should he save money, he could pocket the difference.

It's at this point that the really remarkable aspect of this man's career began to take shape. He analyzed the problems besetting the army and set about to solve them. His plan for reorganization was incredibly complete and detailed--and his method of operation, based on the notion that scientific understanding must precede technological development, continues to be a model for military planning more than 200 years later. His plan concentrated on the two largest expenditures--soldiers food and clothing. He set about solving the clothing problem--were the uniforms the best one could buy? The basic problem was to determine the best cloth for the manufacture of uniforms. It gets cold in Bavaria, so warmth was a prime consideration.

What makes a fabric warm? He began by studying the thermal conductivity--the ability of various materials to allow heat to pass through them. He invented a device which he called a "passage thermometer," which consisted of a thermometer (which he had to build and calibrate) which he wrapped with fibers or fabric to be tested and inserted into a test tube (which he also had to make). This device was placed in boiling water and heated to a high temperature, then removed and plunged into an ice bath. He measured the time it took to fall from the high temperature to a specified low temperature--a time which gave him some measure of the ability of the material to conduce heat. He systematically studied all of the common substances used for clothing and tabulated their conductivities--trying to develop a theoretical basis for understanding their behavior. The problem was that the materials known for warmth--wool and feathers--were relatively good conductors of heat. He had done some studies while in England on the air which adheres to fibers and guessed that more air adhered to warm fibers than to others. But this led nowhere. He tried to measure the effects of moisture, finding that dry air insulated better than damp air. Again he could find no relationship between the absorption of moisture and the thermal conductivity of the fiber.

The answer came by accident. He had what amounted to a flagon filled with wine. Placing it on a window sill to cool following an experiment, he "observed an appearance which surprised me and at the same time interested me very much indeed. I saw the whole mass of liquid in the tube in a most rapid motion running swiftly in two opposite directions, up and down at the same time. . ." He had discovered what we call convection currents and realized for the first time that such currents could transfer heat in ways previously not understood.

With this information in hand, he knew how to construct the ideal fabric for warm and durable winter clothing. But how would he have it manufactured. He was unsuccessful in convincing manufacturers to make the fabric he wanted, so he was faced with a major decision--either to give up or manufacture the fabric himself. He decided to create what he called a "Military Workhouse," to manufacture the uniforms. This effort, in Mannheim, was not successful, since it threatened a loss of business for the previous manufacturers, who made every effort to hinder the project. But he soon had a better idea. Munich had for generations been blighted by street beggars, who comprised about 5% of the population. These miscreants were well organized, well-connected, and even the police would not bother them. They were vicious and parents would mutilate their children to make them greater objects of pity. Colonel Thompson decided to put all of these beggars to work in his workshop. He decided to merge his plan with long-standing plans for a "Poor People's Institute," despite the objections of the organizers. He managed to have the originators of the plan fired and sued the director for misappropriation of state money.

On New Year's Day, 1790, he himself arrested the first beggar and by nightfall every one of them had been processed through city jails. He put them to work making cloth, uniforms and shoes. From his memoirs, ". . .the greater part of these poor creatures were totally unacquainted with every kind of useful labor. It was necessary to give them such work at first as was very easy to perform and in which the raw materials were of little value, and then by degrees as they became more adroit to employ them in manufacturing more valuable articles. . .Those who understood any kind of work were placed in the apartments where the work they understood was carried on. . .the young children.. .were taught to knit and sew." Those who were infirm carded wool and spooled yarn. Workers were fed nourishing meals and children were allowed the same portions as their elders. Time was given for relaxation and children were required to attend school morning and evening each day. Adults were also allowed to attend the school if they requested the opportunity. All books and supplies, as well as the schoolmaster, were supplied.

Thompson is often credited as the first to create a public school system.

He continued his research into nutrition--a daunting task which is still not totally understood. Of course he wanted to feed his soldiers and the workers he had conscripted for as little money as possible. Believing (incorrectly) that water in combination with other foods was a source on nutrution, he hypothesized that soups should be especially nutritious and experimented with hogs to determine what foods allowed them to gain more weight and be healthier--his research indicated that grains and cereals cooked into a gruel resulted in greater weight gain and healthier animals. Consequently, for five years he experimented with soups--to find the recipe which gave the greatest nutrition at the least cost. The basic ingredients of the "Rumford" soups which he invented were peas, potatoes and barley. His experiments convinced him that a man doing hard physical labor could work efficiently if fed no more that a quarter of a pound of solid materials in the form of a soup. He discovered that the rate of eating was important and put stale bread into his soups to slow down the eating process. Ironically, potatoes were not considered edible in Bavaria, so he had to smuggle them in and, only after they had been served for some time, did he reveal their use. He also recommended other foods, such as corn pudding, apple pudding, pasta and various other ways of preparing potatoes.

He then concentrated on the problems engendered by the general idleness of the army. He reasoned that, since so many of them were from rural backgrounds and would return to their farms, he should train them to be better farmers. Such training would keep them occupied and, if they should be able to grow their own food, so much the better for reducing costs. So soldiers were ordered to plant gardens in which they would in fact produce their own food. As you might imagine, his rapid rise to a position of prominence in the court and his success, brought many detractors to the forefront. He was accused of wrecking military discipline and degrading the soldiers by turning them into common farmers, which of course, most of them already were.

But he did hear the criticism--he ordered that walls be build around the military gardens. Further he required that these walls, which were built as military earthworks, be constantly built and rebuilt as training. He then turned to the creation of one of his enduring legacies. The Elector of Bavaria held and enjoyed a large piece of virgin land in Munich--the Red Deer Grassy Meadows, which served as the Elector's private retreat. Thompson had built his military gardens in various locations in Bavaria and had even set up a model in Mannheim which could be replicated throughout the Continent. Eventually, he set about creating a military garden in Munich. He decided to create a park that would not only provide space for his soldiers' gardens, but would also be available to the public for recreation. He saw only one place that was suitable-

-the Elector's Red Deer Grassy Meadows. It is a testimony to the power of his persuasive ability that he eventually convinced the Elector to give up his favorite retreat for a municipal garden--the renowned English Gardens, much of which remains today as a public park in Munich. As he conceived the project, it included the necessary military gardens, but it also included formal gardens, lodges, a veterinary school, farms for breeding cattle, areas for hiking and a six-mile long promenade.

Thompson's abilities in reorganizing the Bavarian army--an army that Ludwig II would inherit and squander-- were astounding. By the power of his intellect and personality, he swept the city of vagrants and put them to work in workhouses. He drilled a useless army into a competent military machine. He held, fed, clothed, and armed 12,000 defenders for Munich. Continuing his systematic analyses of efficiency, Thompson systematically studied the heats of combustion of all the then available fuels, building the first combustion calorimeter. He invented what we would call the modern kitchen, with its sink, running water, an ice box, the handy stove (he invented lots of stoves and made and lost fortunes on them), the double boiler, the baking oven, the pressure cooker, even the trash slot, the broom closet, and the overhead cupboards. Recognizing the poor lighting in the workhouse, he began a systematic study of lamps, inventing a quantitative way of measuring the light output--the science of photometry, and the idea of a standard candle and candlepower. He determined that the best lamp was a type previously invented by Argand, improved by Thompson to burn rapeseed oil. Much later in his life, he returned to the question of lamp design.

Thompson's many innovations for helping the homeless and poor in Bavaria placed him among the pioneers in social reform. He had established free schools for poor children, industrial schools, a college for veterinary surgeons, home industries, and off-duty work at extra pay for hitherto idle soldiers. He had encouraged the planting of gardens, crop rotation, and the growing of food plants such as turnips and potatoes, until then considered poisonous by many Europeans. He designed and had built in Munich the 600-acre public English Garden. In 1792, for all these contributions, the elector of Bavaria made Benjamin Thompson, who by now had risen to Minister of War, Minister of Police, Major General, Chamberlain of the Court, and State Councillor, a count of the Holy Roman Empire. For his title, Thompson chose Rumford, the earlier name of Concord, New Hampshire, where his fortunes had changed so dramatically.

However, lest you begin to admire this man, there were other views of him. At one point, citizens of Munich decided to honor him for the creation of the English Garden. Petitions were circulated. The town fathers, who disliked and distrusted the American, brought various forms of pressure to bear on the populace to prevent them from signing the petition. Thompson, hearing of this, went to the Elector and told him that the city leaders were preventing the populace from expressing their gratitude to the Elector for his generous gift to them. The elector removed all of them from public office and forced each to kneel in front of a portrait of the Elector and beg forgiveness.

There's a certain irony that von Steuben, the student of Frederick the Great, should go to America and save the American army from shooting itself in the foot--while Rumford, a student of complete nastiness, should find his way into the interior of the Holy Roman Empire to reform armies, governments, and urban planning. But such is the case.

In 1798, suffering from exhaustion and ill health, Count Rumford left Bavaria for a 16-month tour of Italy. When he returned to Munich, half the population gathered in the English Garden to pay homage to him. He was not yet 40 years old. He again turned to research and during this time carried out the research which earned him his footnotes in modern physics books.

At the end of the 18th century, heat was thought to be a fluid, caloric. The more caloric fluid an object had, the hotter it was, and vice versa. Since the fluid had volume, heated objects expanded and so forth. We still use the language of this caloric theory when we talk about heat "flowing" from one place to another, and we measure the amount of heat in "calories." While in London, Thompson had done a series of experiments to explain the force of gunpowder which was thought to be due to the caloric fluid released in the explosion. As usual, he had carried out a series of experiments on the basic physics of the explosion. In particular, he was puzzled because the gunbarrel always got hotter when no shell was fired than when a shell was actually fired. The amount of caloric fluid released ought to be the same either way, thus the temperature of the barrel ought to be the same. He was aware of at least one author who had argued that heat, like sound, was related to vibrations in an object--and since the cannonball caused the gas to move through the barrel at a slower speed, it caused lower frequency vibrations and thus lower temperature. In Munich, he held the position of Inspector General of Artillery, responsible for the production of cannons. The cannons were cast as solid cylinders and then the barrel was bored by a large drill, turned by horses which turned a capstan. Considerable heat is generated in the process, as anyone who has ever drilled metal knows. Rumford reasoned as follows: "If the existence of caloric were a fact, it must be absolutely possible for a body. . .to communicate this substance continuously to other bodies without this substance gradually being entirely exhausted.. . .A sponge . . .communicates its moisture to the air, but soon the water evaporates and the sponge can no longer give out moisture. . .a bell sounds. . .when it is struck and gives out its sound as often as we please. . .Moisture is a substance, sound is not."

Rumford devised an experiment in which the cannon and its drill were immersed in a large metal box filled with water. The water boiled and boiled, with the only source of heat being the friction between the cannon and the drill. He set the experiment on a street corner in downtown Munich so that passersby could marvel at the water boiling away with no fire. He found that no matter how long he kept the experiment going, the time it took to boil the water starting from ambient temperature was always the same, indicating no diminishing of the caloric fluid. Further he measured the mass of the solid cannon and then the mass of the finished cannon and all the shavings which fell beneath the cannon and found no difference in the weight, despite the large amount of heat (caloric fluid) which had been released. Although he was quick to admit that he did not understand the nature of heat, he did conclude that heat "was excited and communicated . . .[by]. .motion." A half century later, James Prescott Joule would demonstrate that Rumford's data could be used to compute what we now call the mechanical equivalent of heat--linking heat to motion--with a reasonable degree of accuracy.

In 1795, he asked the Elector to allow him leave and he returned to London, where he was to make perhaps his most significant invention. After centuries of smoky fireplaces, Rumford, following a characteristic study of the problem, invented the modern (or Rumford) fireplace and the damper in 1801. This alone made him a hero throughout the continent. He supervised its installation in many English homes.

In 1796, he provided funds to the Royal Society of London and to the American Academy of Arts and Sciences to endow a medal for outstanding research done in the areas of heat and light during the previous two years. The Royal Society gave its first such prize to Rumford himself in 1802. It would be 40 years before the American Academy gave its first Rumford prize. The $5000 he gave to endow each prize has grown and Rumford prizes are today quite prestigious.

The Count's stay in London was cut short when he was recalled to Bavaria by the Elector in the summer of 1796. France and Austria were at war and the war was spilling over into much of the rest of Europe, including Bavaria. It took Rumford three weeks to return to Munich and he found the in a precarious position. His enemies, who saw only disaster, had gleefully cast him as a sacrificial lamb, convincing the Elector to place him in command of the Army, in which no one, including the Elector had confidence. The Elector and the court fled to Mannheim. As the two invading armies approached Munich, Rumford brought his entire army inside the city walls.

As the Austrian army approached, he met with its commanders and convinced them to camp outside the city. When the French approached from the other side, he convinced them that since he had persuaded the Austrians not to enter the city, there would be no point in a French attack. This shuttle diplomacy continued for several weeks as the two armies faced each other, with Munich and the Count's 12,000 man army in the middle. The French army eventually left to put out a fire elsewhere on the line and the Austrians subsequently left. The Count had won a major diplomatic victory without the firing of a single shot. Prior to leaving for London, he had planned to construct a major esplanade totally surrounding the city. While he was away, the city leaders, who detested him, build several public buildings in the path of this proposed esplanade. As he prepared for the possibility of a battle with the French and Austrians, he blew up all of these buildings in the process of leveling the ground. Of course, with the outcome, no dared oppose his continuing plans for the remainder of the park. Even during the defacto siege, he was carrying out experiments to determine the best way to feed soldiers in the field.

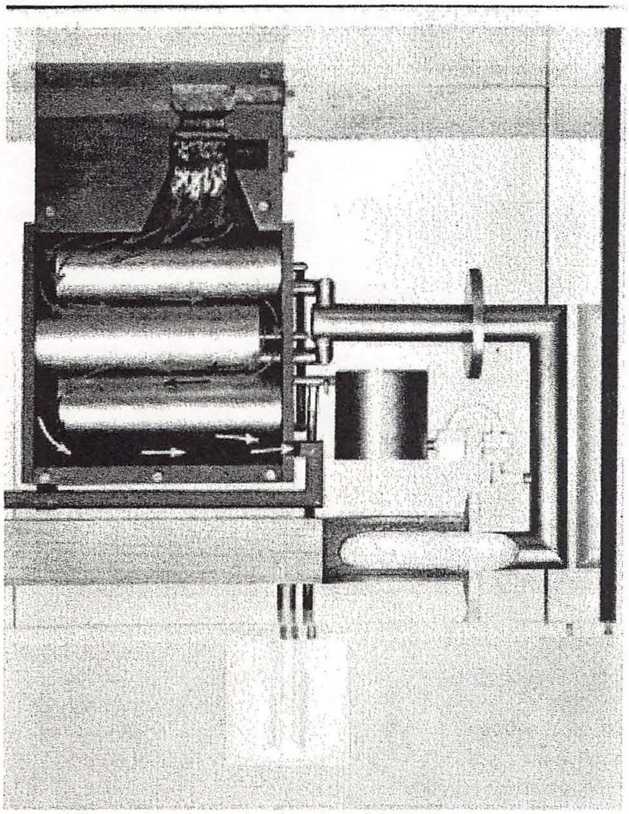
In 1798, recognizing the Count was becoming a political liability, the Elector proposed that Rumford be named Ambassador to the Court of Saint James, but George III would not accept his credentials. So he found himself in London, 45 years old, without a job. He thought about retiring to America, and even proposed the creation of a military academy in the United States. At first, President Adams was sympathetic to the proposal (there was no FBI to tell him of the early life of the Count), but eventually the offer was refused. He also offered to become the first superintendent of the U.S. Military Academy at West Point.

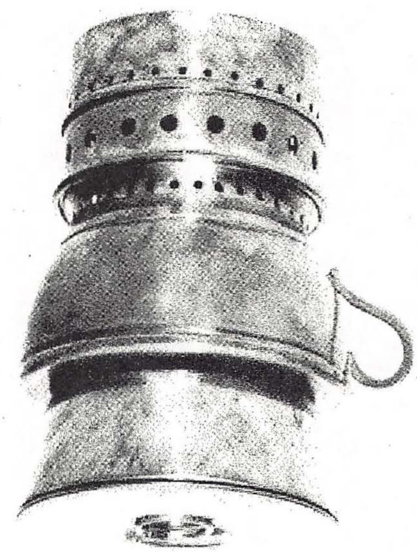
He continued to research and to write. He recommended and helped establish the first research center in the world--the Royal Institution. The Royal Institution of London was established to make his inventions and those of others available to the public at large, without cost. He soon ran afoul of other inventors, most notably James Watt, who did not wish to give away the rewards to be gained by their inventions. He did hire Sir Humphrey Davy, who became one of England's most famous scientists, to be the director. Davy in turn hired a young fellow named Michael Faraday to be his laboratory assistant. Because of disagreements with associates at the institution, Rumford eventually resigned and left London for Paris, never to return.

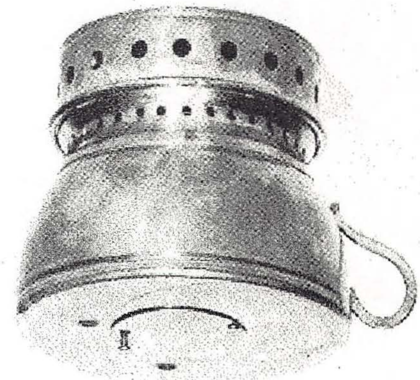
Karl Theodor, the Elector, died in 1799 and his nephew, the Duc de Deux Ponts, succeeded him as Maximilian Joseph. Rumford returned briefly to Munich, then traveled to Paris, where he eventually settled. In Paris, he courted and eventually married Marie Anne Pierette Paulze, the widow of the great chemist Lavoisier. It took time and effort for him to prove that he was, in fact, single. The wife whom he had abandoned had died about ten years earlier. He and Madame Lavoisier did have children (whose descendants carry the name Rumford rather than Thompson). By 1809 they were formally separated. Rumford retired to a Paris suburb, where he returned to his research, writing on a wide range of topics. During this period, he returned to the study of lamps and lighting, inventing a very different kind of lamp. Rumford was very proud of the fact that he never sought a patent on his inventions. His improved lamp was challenged in the French courts by a relative of Argand, who held the patents on the then most common lamp design. Of course, the Count responded vigorously and eventually won two patents on his new design. He invented the first effective steam heating system, studied the transfer of heat by radiation, invented the drip coffeepot and a portable student lamp. As a mark of his importance, despite the fact that England and France were at war, Sir Humphrey Davy sought and received permission to visit him in Paris for scientific purposes--he brought along his young assistant, Michael Faraday.

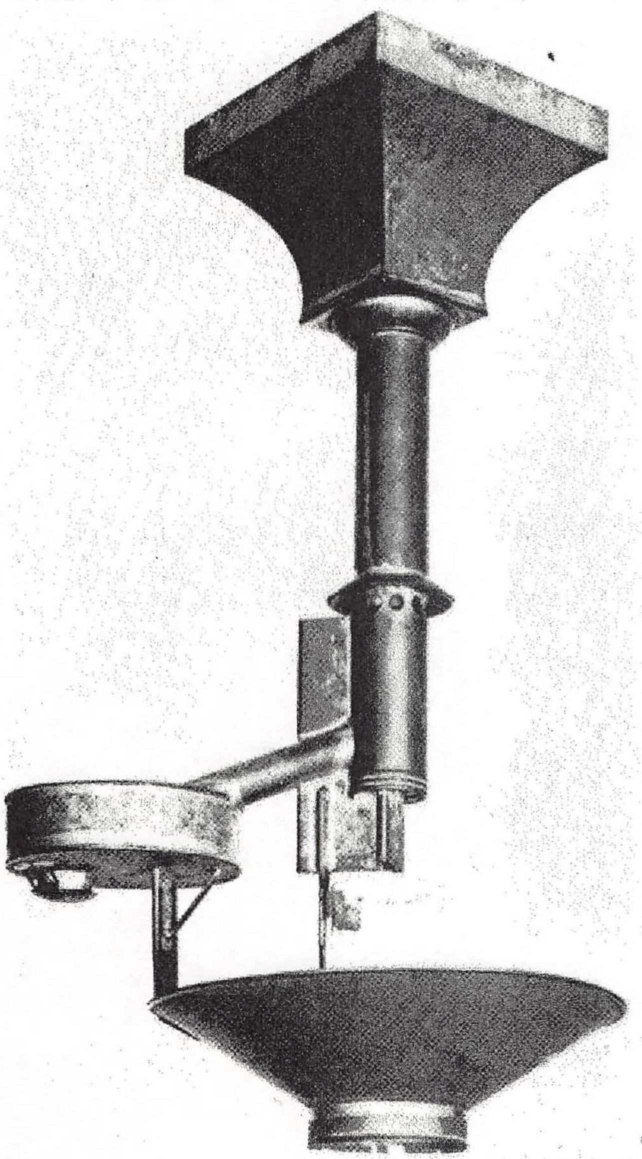
He died suddenly on the 21st of August, 1814, at the age of sixty-one. His will specified that his estate be left to Harvard College and he had the document witnessed by the Marquis de Lafayette in an attempt to assure that the gift would be accepted. He was buried in Auteuil. In a eulogy, Baron Cuvier, the secretary of the French Academy of Sciences, with which the Count had been heavily involved, said "Nothing would have been wanting to his happiness had the amenity of his behavior equaled his ardor for public utility. But it must be acknowledged that he manifested in. . .his conduct a feeling which must appear so extraordinary in a man so uniformly well treated by others and who had himself done so much good. It was without loving or esteeming his fellow creatures that he had done them all these services. . ."

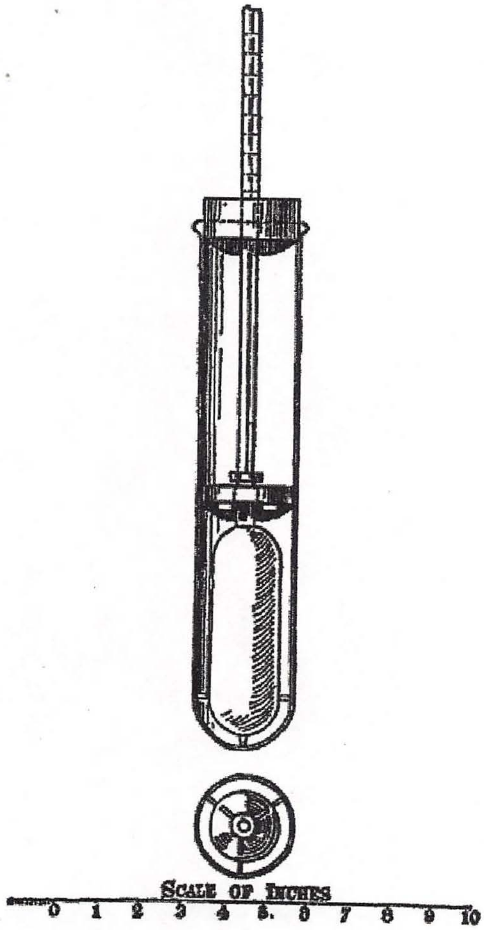
SCIENTIST, inventor, innovator, spy, soldier of fortune, social reformer--admired, despised, honored, vilified--Benjamin Thompson, Count Rumford, a New Englander by birth: Who was this man? And why is he so obscure today? He was in fact the first person I can find who did genuine applied science. He left a legacy of research and invention equalled by few persons. His improvements in the areas of everyday life alone, particularly when coupled with his social reforms should have earned him lasting fame. But they did not do so. None of the four nations with whom he is associated, America, England, Germany or France, seem to remember him. He died essentially as a man without a country.











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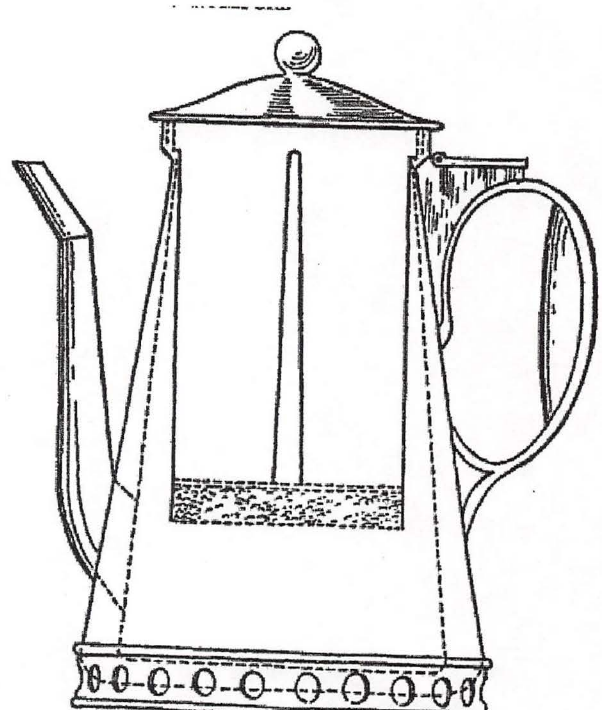

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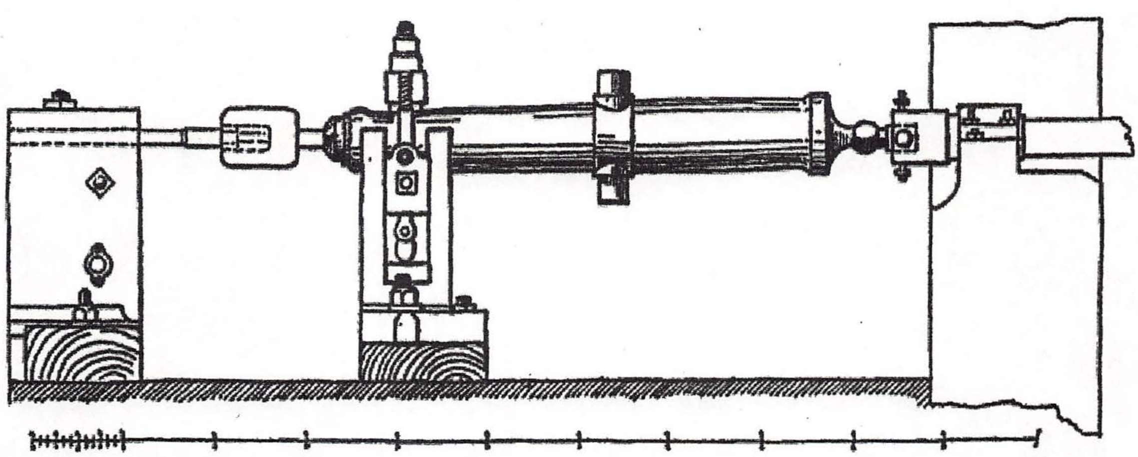

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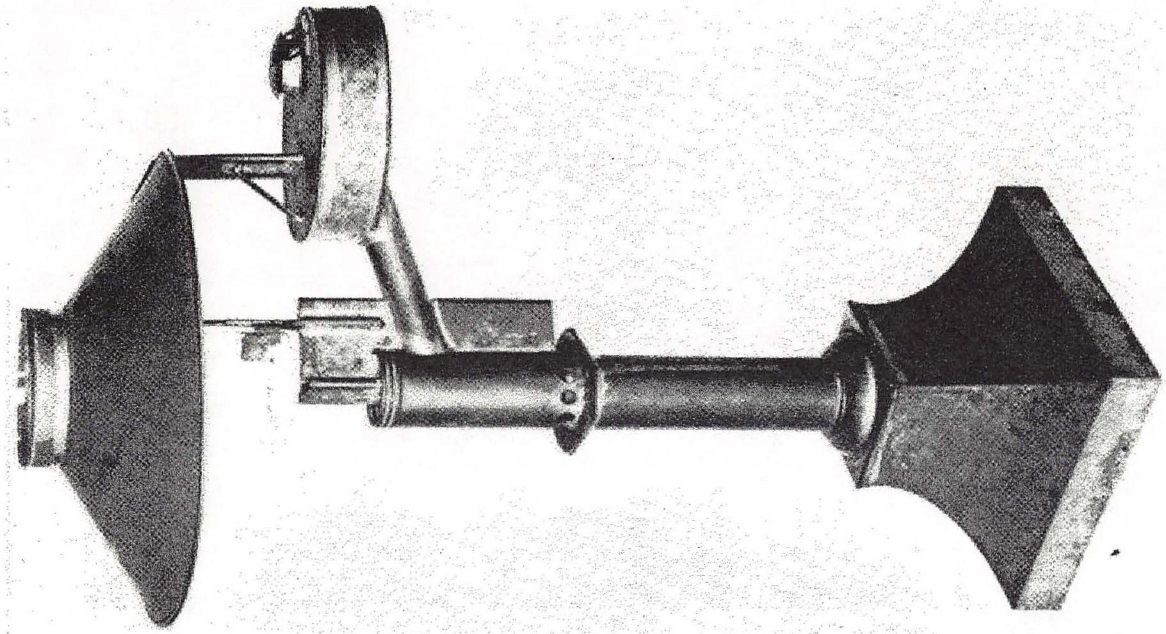

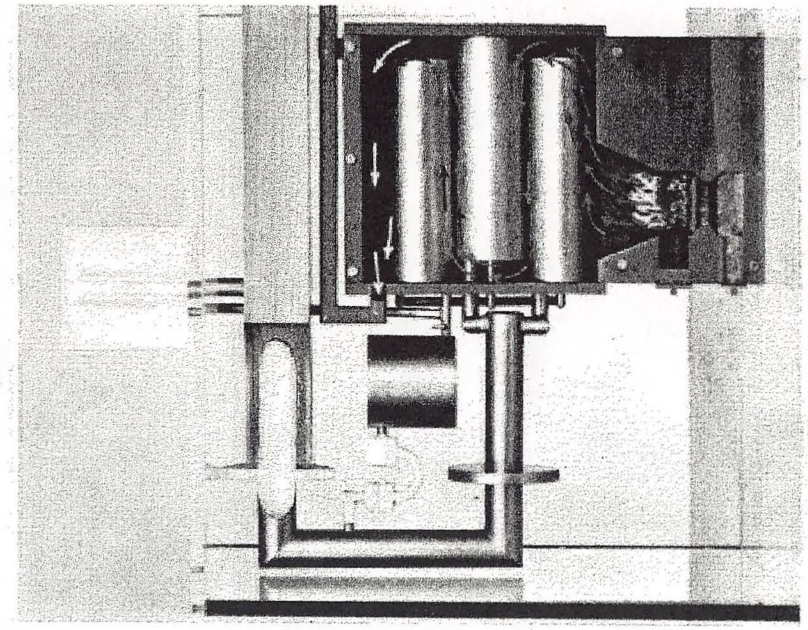

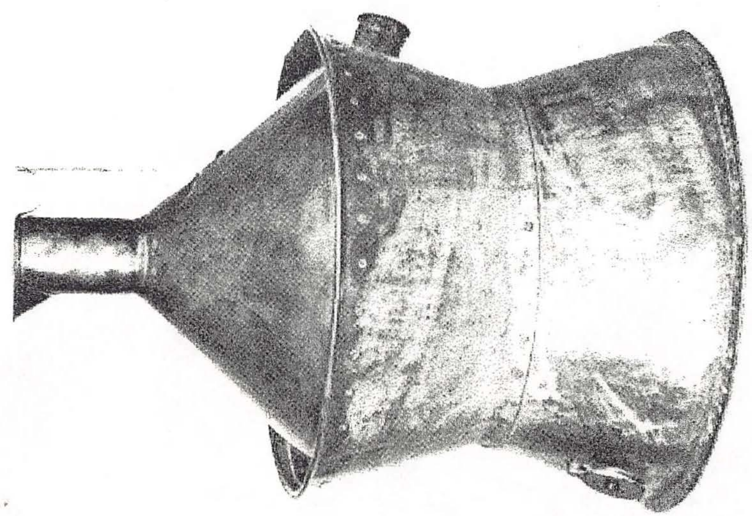

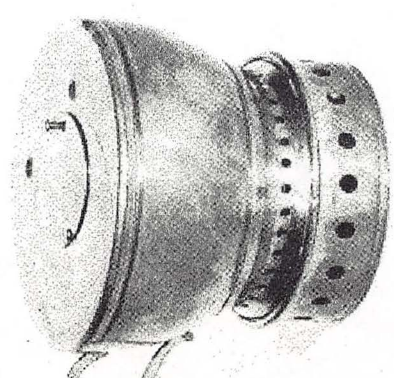

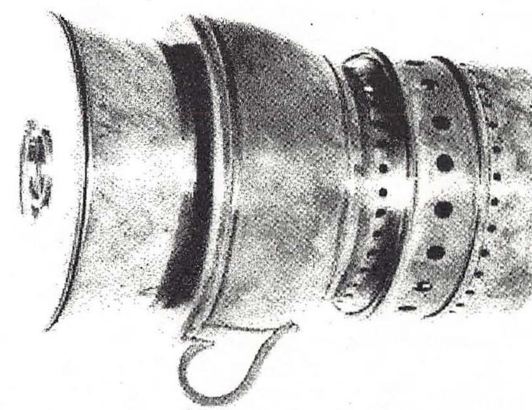

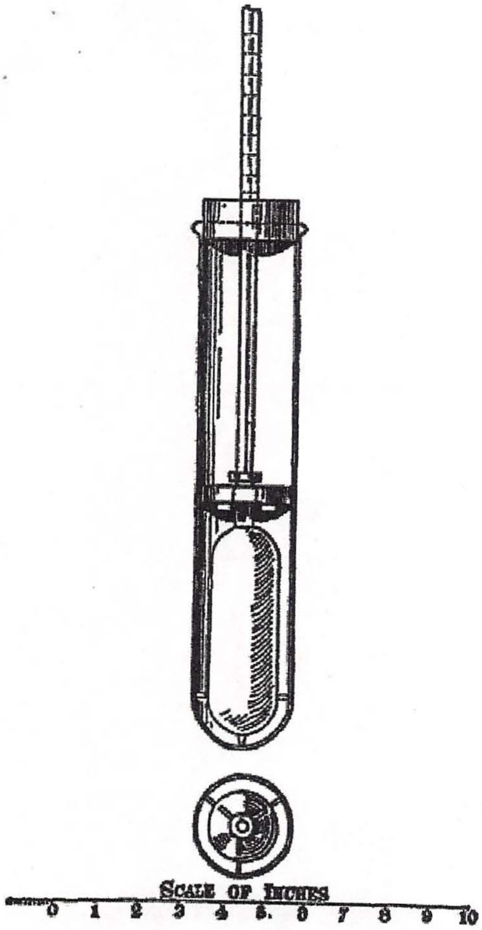

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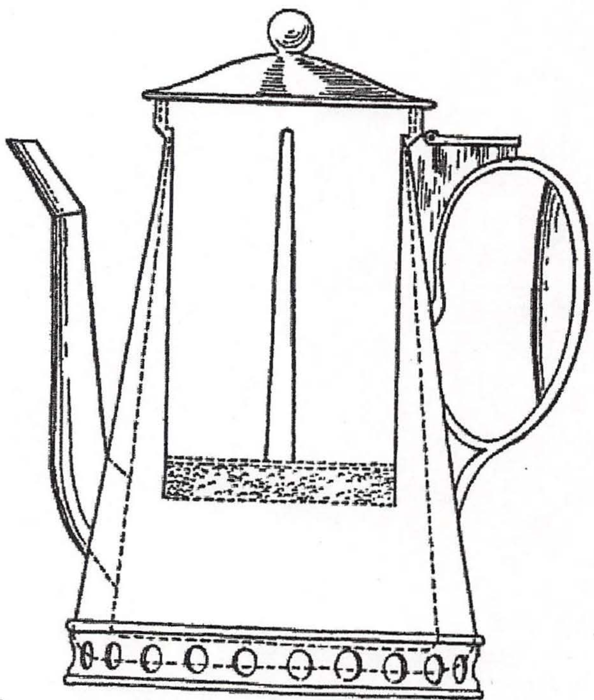

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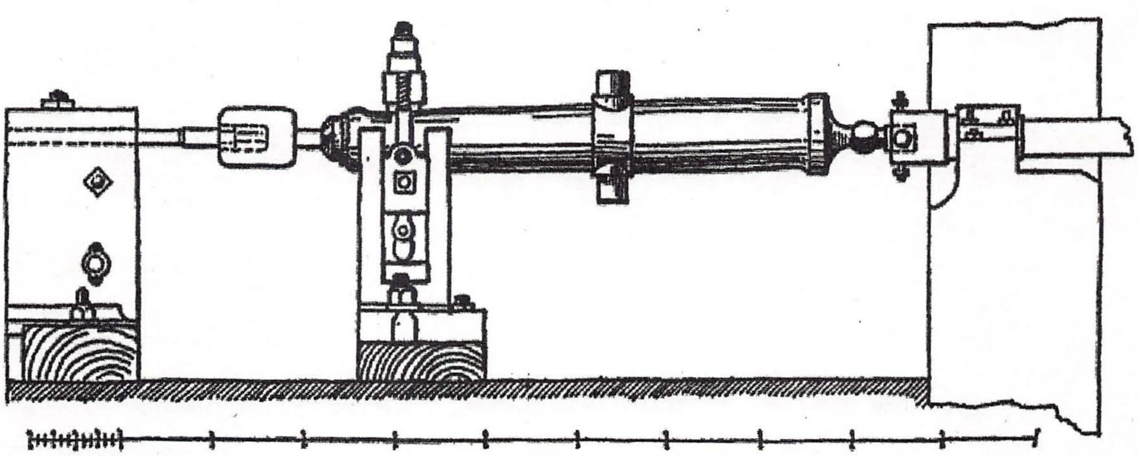

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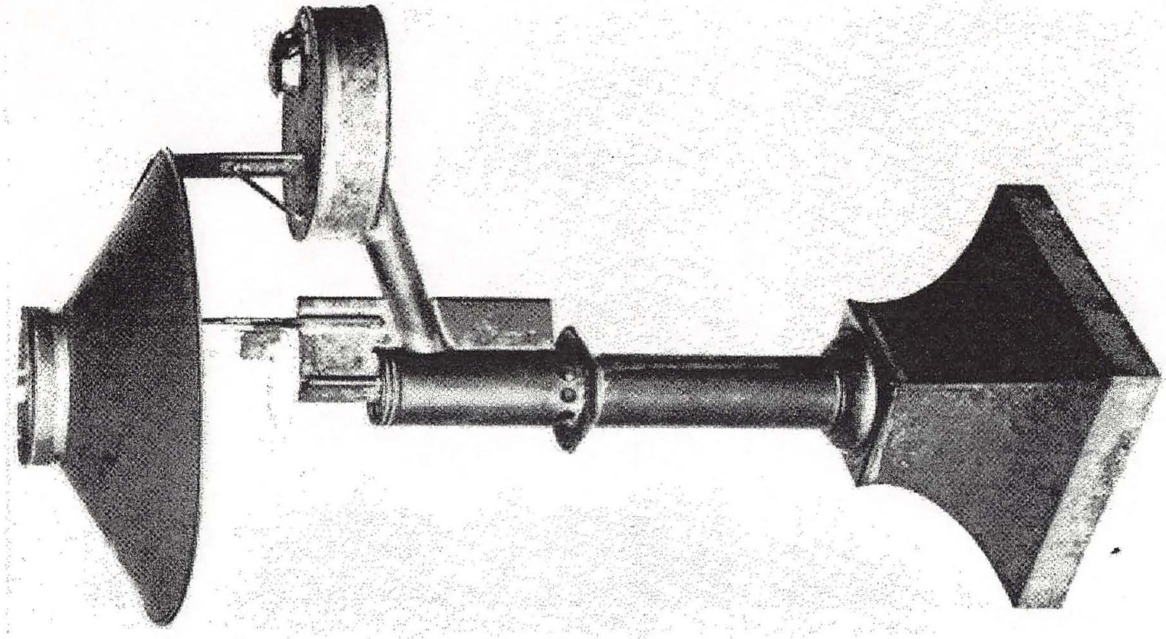

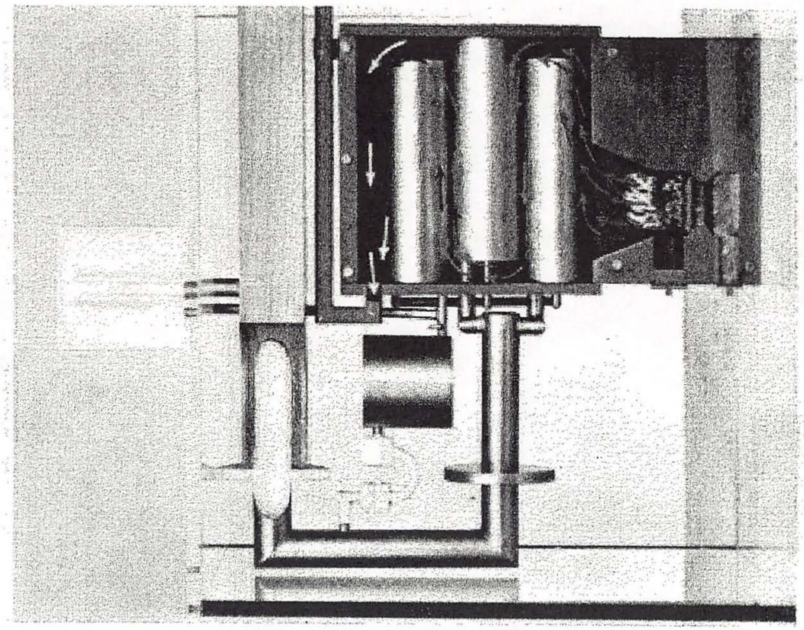

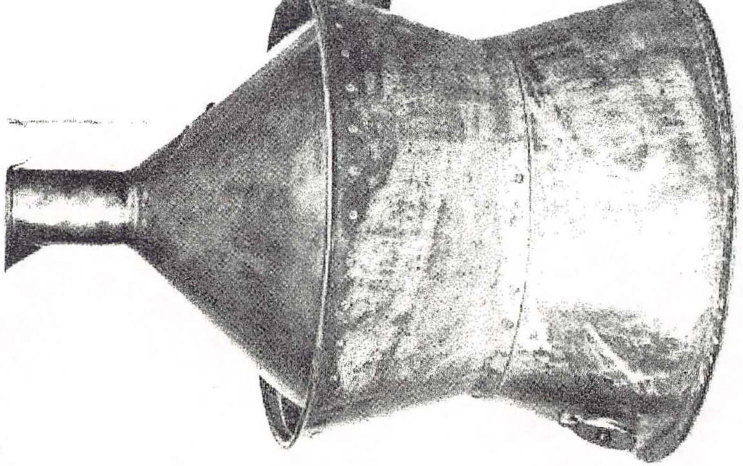

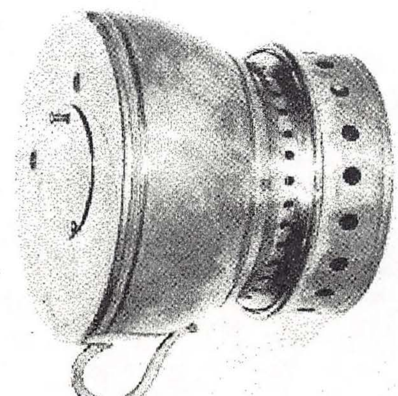

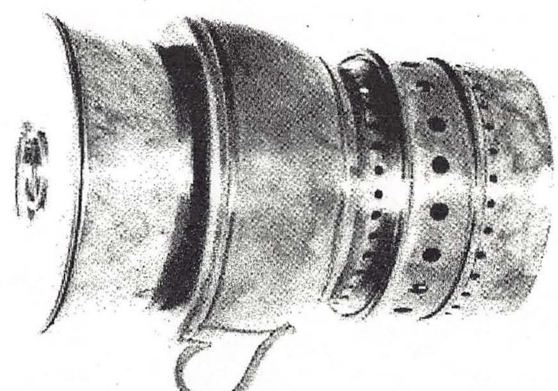

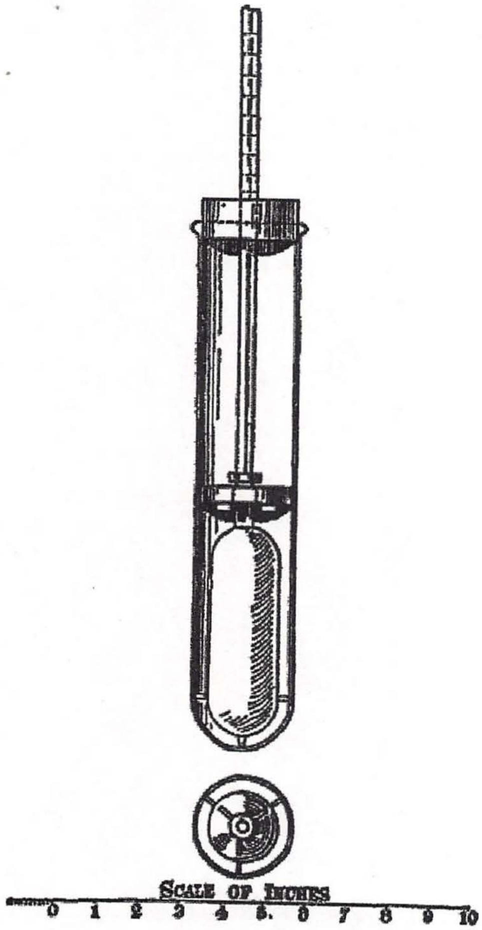

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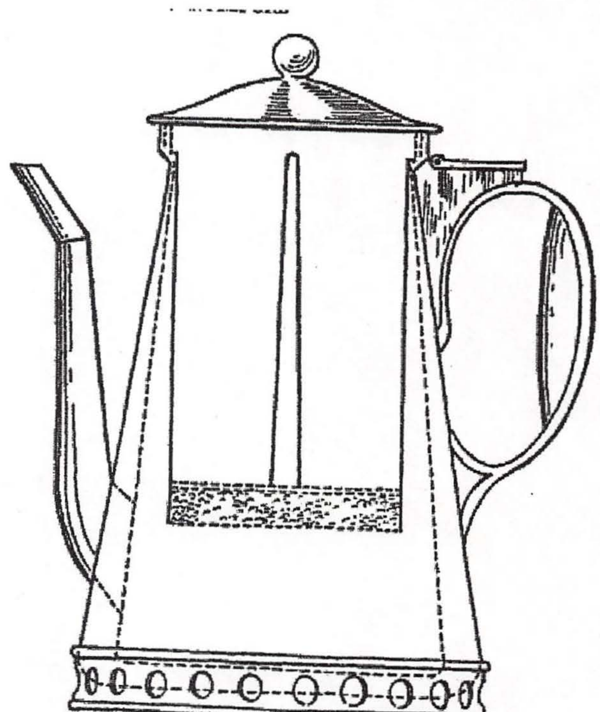

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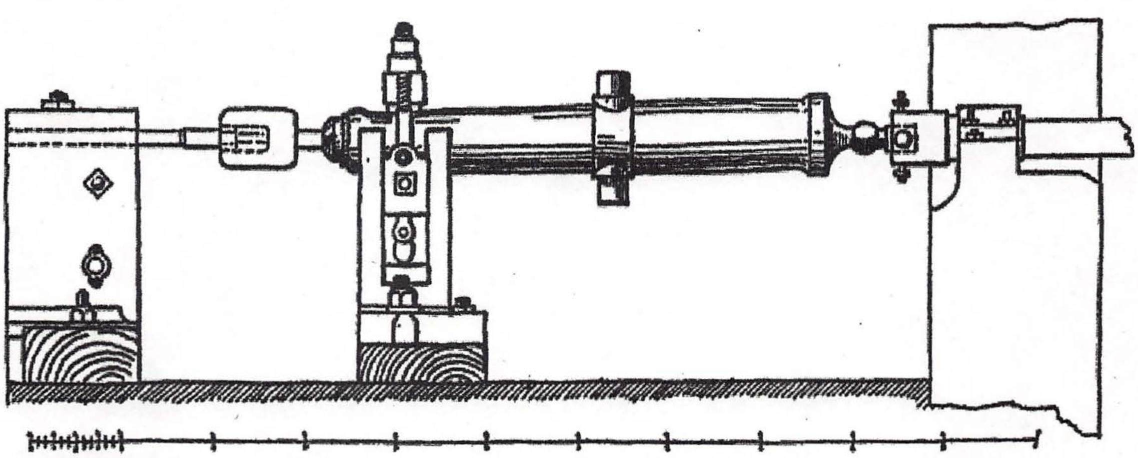

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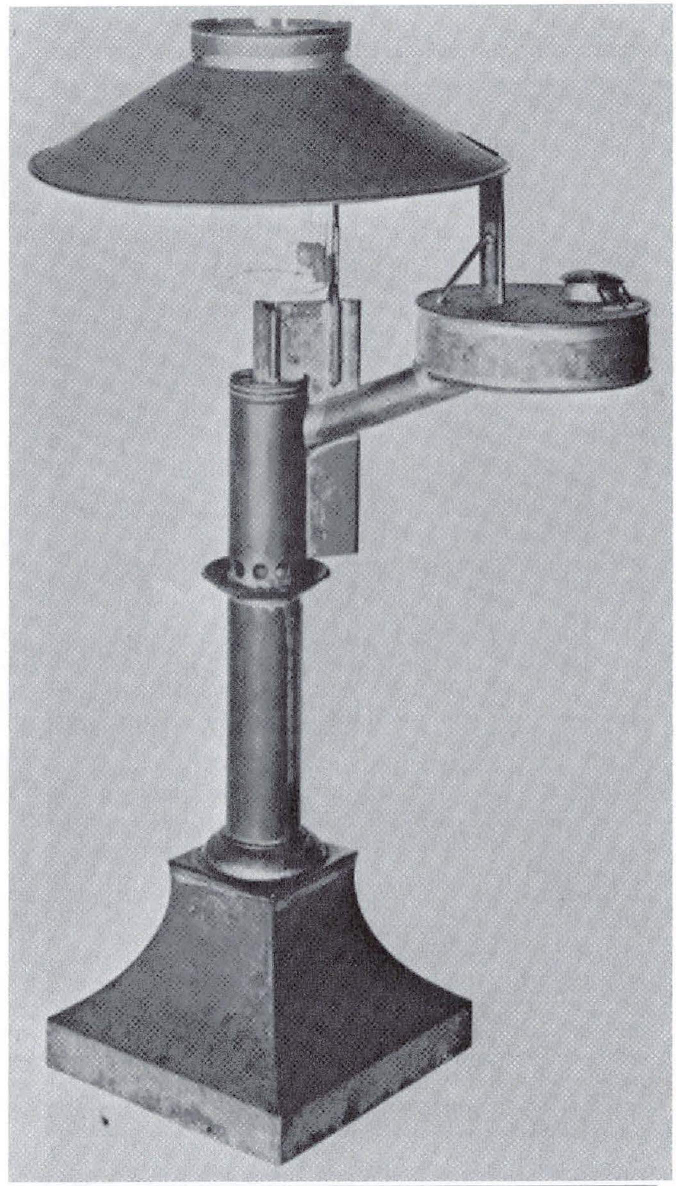

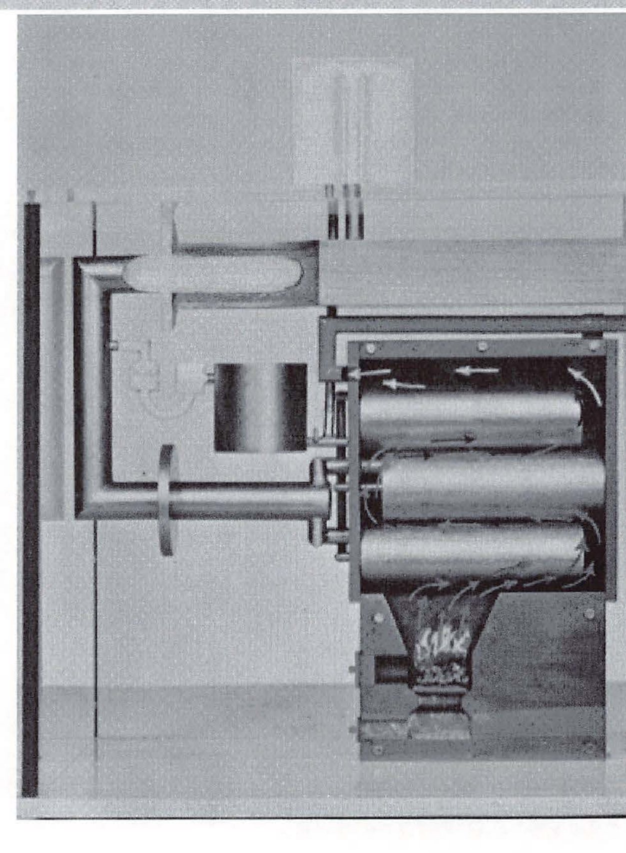

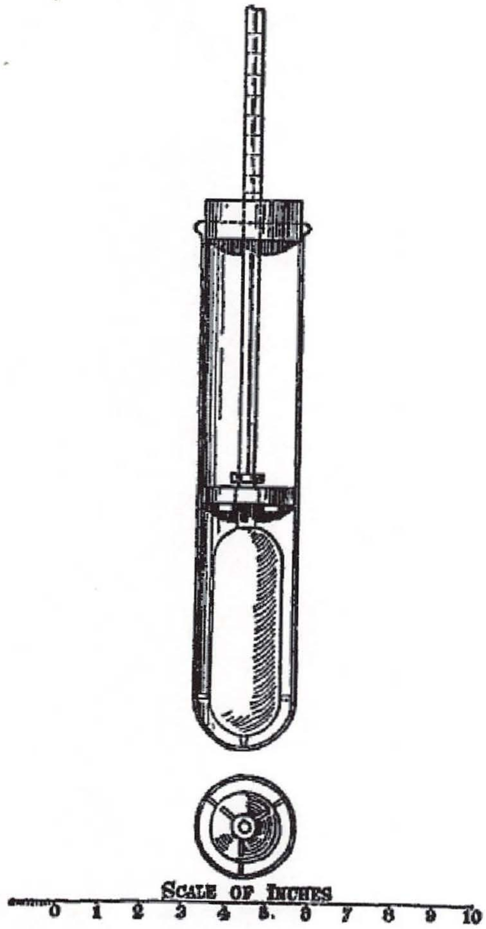

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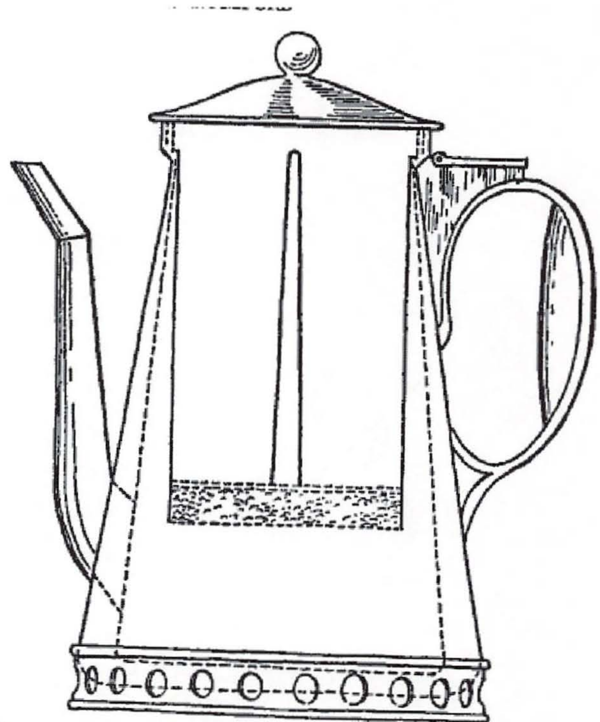

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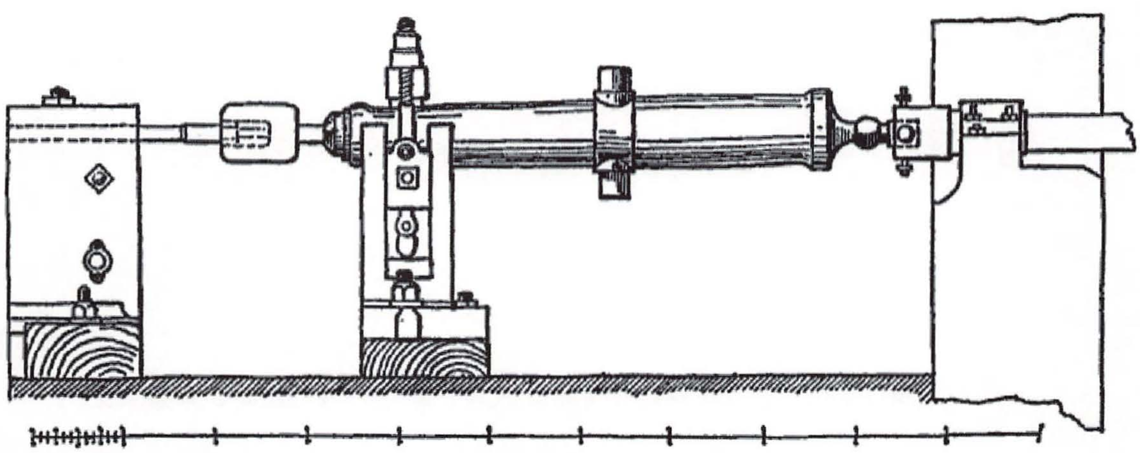

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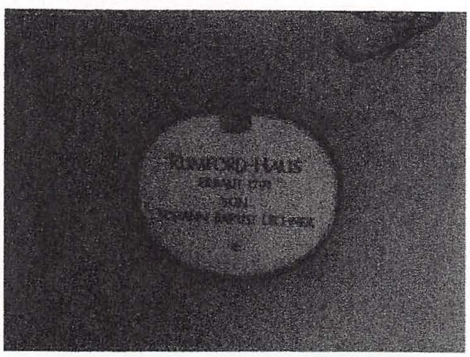
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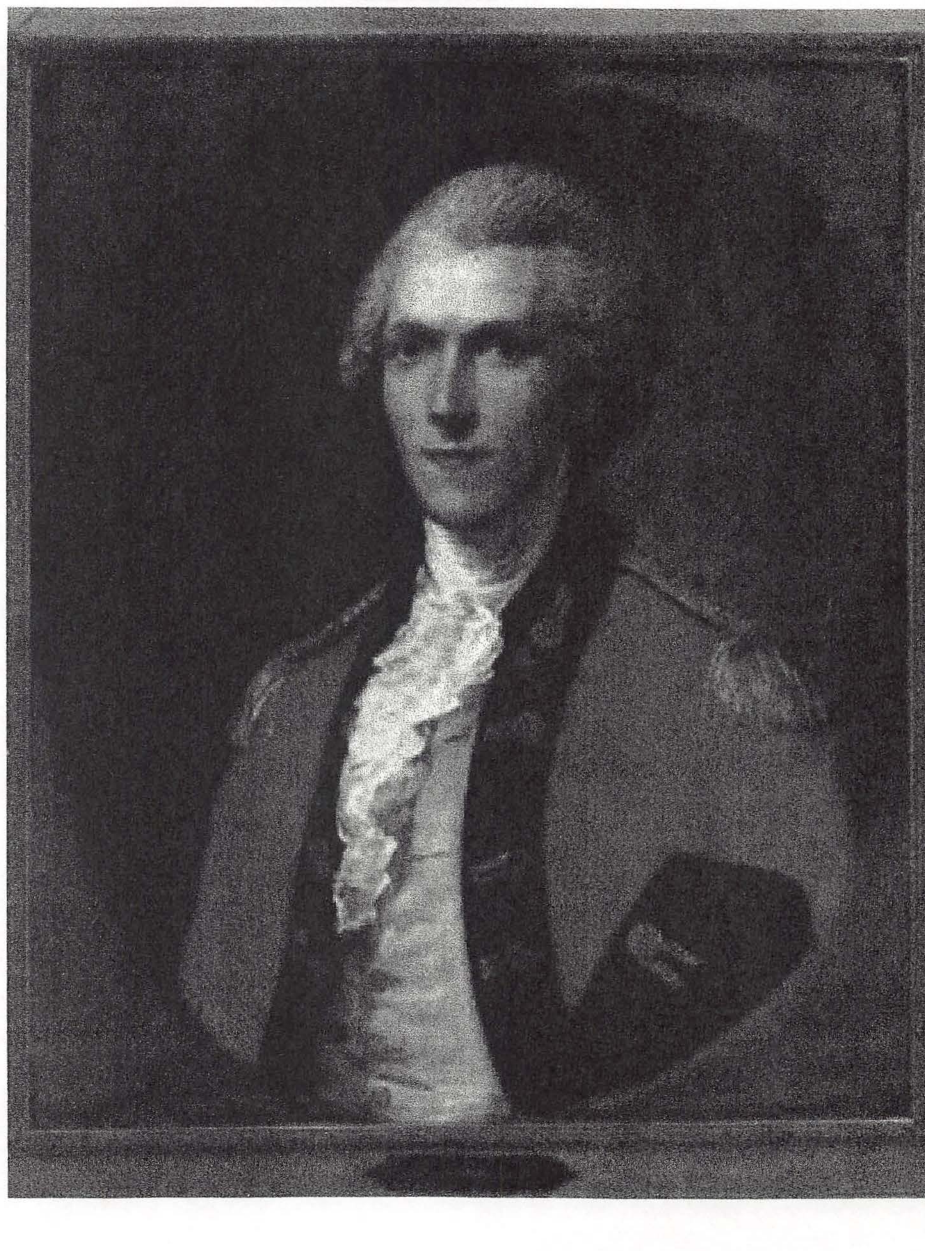

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