so successfully performed that no difference was perceptible in the character of the iron flowing from the several furnaces. The filling of the mold proceeded with the same success, and at a quarter to one—twenty-five minutes after the furnaces were tapped, the mold was filled and they were stopped off—170,000 lbs. of metal having in the meantime passed through the pool—nearly 7,000 lbs. per minute. The operation passed off more successfully than any casting we have heretofore witnessed, no difficulting arising at any stage, notwithstanding the immense weight of iron used.

The monster gun will be reduced in the lathe from a rough weight of 170,000 lbs. to a finished weight, calculated, of 115,000. The whole length from breech to muzzle will be 243·33 inches; length of bore 210 inches. The maximum diameter will be 64 inches, minimum, 34 inches. The solid round 20-inch shot will weigh 1,000 lbs, and the shell about 700 lbs. The charge of powder will vary according to circumstances from 65 to 80 lbs. Some two weeks must elapse before the gun will be lifted from the pit, and many weeks before it will leave the lathe in a partially finished condition, to be chipped, filed and fitted ready for mounting. We presume that the testing will be performed in that vicinity and the gun then brought East to some of our sea-coast forts—probably to our own city.

The lathe in which this gun is to be turned is one of the most massive, we believe, ever constructed—the whole weight being 208,000 lbs.

THE MOST IMPORTANT AMERICAN DISCOVERIES AND INVENTIONS.

No. 1.

THE IDENTITY OF LIGHTNING AND ELECTRICITY.

Franklin.—1752.

The mode in which this great discovery was suggested to Dr. Franklin we give in his own words, extracted from his autobiography:

"In 1746, living then in Boston, I met with Dr. Spence, who was lately arrived from Scotland, and showed me some electric experiments. They were imperfectly performed as he was not very expert; but, being on a subject quite new to me, they equally surprised and pleased me. Soon after my return to Philadelphia, our library company received from Mr. Peter Collinson, Fellow of the Royal Society of London, a present of a glass tube, with some account of the use of it, in making such experiments. I eagerly seized the opportunity of repeating what I had seen in Boston; and, by much practice acquired great readiness in performing those also which we had an account of from England, adding a number of new ones. I say much practice, for my house was continually full, for some time, with persons who came to see those wonders.

"To divide a little this incumbrance among my friends, I caused a number of similar tubes to be blown in our glass-house, with which they furnished themselves, so that we had at length several performers. Among these the principal was Mr. Kinnersley, an ingenious neighbor, who, being out of business, I encouraged him to undertake showing the experiments for money, and drew up for him two lectures, in which the experiments were ranged in such order, and accompanied with explanations in such method, as that the foregoing should comprehend the following. He procured an elegant apparatus for the purpose, in which all the little machines that I had roughly made for myself were neatly formed by instrument-makers. His lectures were well attended, and gave great satisfaction; and after some time he went through the colonies, exhibiting them in every capital town, and picked up some money. In the West India Islands, indeed, it was with difficulty that the experiments could be made, from the general moisture of the air.

"Obliged as we were to Mr. Collinson for the tube, &c., I thought it right he should be informed of our success in using it, and wrote him several letters containing accounts of our experiments. He got them read in the Royal Society, where they were not at first thought worth so much notice as to be printed in their *Transactions*. One paper, which I wrote for Mr. Kinnersley, on the sameness of lightning with electricity, I sent to Mr. Mitchell, an acquaintance of mine, and one of the members also of that society; he wrote me word that it had been read but was laughed at by the connoisseurs. The papers, however, being shown to Dr. Fothergill, he thought them of too much value to be stifled, and advised the printing of them. Mr. Collinson then gave them to Cave for publication in his *Gentleman's Magazine* but he chose to print them separately in a pamphlet, and Dr. Fothergill wrote the preface. Cave, it seems judged rightly for his profession, for by the additions that arrived afterwards, they swelled to a quarto volume, which has had five editions, and cost him nothing for copy-money.

"It was, however, some time before those papers were much taken notice of in England. A copy of them happening to fall into the hands of the Count de Buffon, a philosopher deservedly of great reputation in France, and indeed all over Europe, he prevailed with M. Dubourg to translate them into French; and they were printed at Paris. The publication offended the Abbé Nollet, Preceptor in Natural Philosophy to the Royal Family and an able experimenter, who had formed and published a theory of electricity, which then had the general vogue. He could not at first believe that such a work came from America, and said it must have been fabricated by his enemies at Paris to oppose his system. Afterwards, having been assured that there really existed such a person as Franklin at Philadelphia, which he had doubted, he wrote and published a volume of letters, chiefly addressed to me, defending his theory, and denying the verity of my experiments, and of the positions deduced from them.

"I once purposed answering the Abbé, and actually began the answer; but on consideration that my writings contained a description of experiments which any one might repeat and verify, and if not to be verified, could not be defended; or of observations offered as conjectures, and not delivered dogmatically, thence not laying me under any obligation to defend them; and, reflecting that a dispute between two persons, written in different languages, might be lengthened greatly by mistranslations, and thence misconceptions of one another's meaning—much of one of the Abbé's letters being founded on an error in the translation—I concluded to let my papers shift for themselves; believing it better to spend what time I could spare from public business in making new experiments than in disputing about those already made. I therefore never answered M. Nollet; and the event gave me no cause to repent my silence; for my friend M. Le Roy, of the Royal Academy of Sciences, took up my cause and refuted him; my book was translated into the Italian, German, and Latin languages; and the doctrine it contained was by degrees generally adopted by the philosophers of Europe, in preference to that of the Abbé; so that he lived to see himself the last of his sect, except Monsieur B——, of Paris, his *élève* and immediate disciple.

"What gave my book the more sudden and general celebrity was the success of one of its proposed experiments, made by Messieurs Dalibard and De Lor at Marly, for drawing lightning from the clouds. This engaged the public attention everywhere. M. De Lor, who had an apparatus for experimental philosophy and lectured in that branch of science, undertook to repeat what he called the 'Philadelphia Experiments;' and, after they were performed before the king and court, all the curious of Paris flocked to see them. I will not swell this narrative with an account of that capital experiment, or of the infinite pleasure I received in the success of a similar one I made soon after with a kite at Philadelphia, as both are to be found in the histories of electricity.

"Dr. Wright, an English physician, when at Paris, wrote to a friend, who was of the Royal Society, an account of the high esteem my experiments were in among the learned abroad, and of their wonder that my writings had been so little noticed in England. The Society on this resumed the consideration of the letters that had been read to them; and the celebrated Dr. Watson drew up a summary account of them, and of all I had afterwards sent to England on the subject; which he accompanied with some praise of the writer. This summary was then printed in their *Transactions;* and some members of the Society in London, particularly the very ingenious Mr. Canton, having verified the experiment of procuring lightning from the clouds by a pointed rod and acquainted them with the success, they soon made me more than amends for the slight with which they had before treated me. Without my having made any application for that honor they chose me a member; and voted, that I should be excused the customary payments, which would have amounted to twenty-five guineas, and ever since have given me their *Transactions* gratis. They also presented me with the gold medal of Sir Godfrey Copley, for the year 1753, the delivery of which was accompanied by a very handsome speech of the president, Lord Macclesfield, wherein I was highly honored."

Dr. Franklin, afterwards, in a letter to a friend in England, gave a full account of his experiment with the kite:—

While he was waiting for the completion of a spire which was being erected in Philadelphia, it occurred to him that he might raise a lightning rod in the air by means of a kite. He accordingly constructed a light cross of cedar wood, which he covered with a large, thin silk handkerchief. Into the upper end of the kite he inserted a pointed wire about a foot in length, and connected this wire with the string which was of hemp. The lower end of the string was terminated by a silk cord, and at the junction of the hemp and silk was attached an iron key. He then waited for the approach of a thunder-shower, and seeing a cloud arising, he took his son with him, and going out of the city raised his kite. For a considerable time there was no manifestation of electricity, the cloud passing over the kite without producing any effect—and he began to despair of success. After a time, however, he saw the fibres of the hemp string bristling out, and, presenting his knuckles to the key, he received a spark. After it began to rain and had wet the string, increasing its conducting power, the sparks came in profusion.

This experiment was made in June 1752, and Franklin was then 46 years of age. Though similar experiments had been made just previously by Dalibard and De Lor, in France, yet as those were made in accordance with directions furnished by Dr. Franklin, the credit of the discovery is fully awarded to him by the most eminent French writers, including De la Rive.

The discovery immediately attracted universal attention and the experiment was repeated throughout Europe. In St. Petersburgh it cost one learned professor his life. Professor Richman was engaged in writing a work on the electricity of the atmosphere, and had erected a lightning-rod on his house. In the forenoon of Aug. 6th, 1753, he was attending a regular meeting of the Academy of Sciences, when he heard distant thunder, and immediately hastened home to observe his rod, taking with him his engraver, Sokolow, to witness the phenomena, so that he might be able to represent them. The lower end of Prof. Richman's rod terminated in a glass jar, and he had attached a light string to the rod to indicate the degree of electrical excitement. The string was standing at 4°, and Prof. Richman was explaining to Mr. Sokolow the extreme danger if it should rise to 45°, when there came a terrible clap of thunder that startled all St. Petersburgh. Professor Richman stooped down to look at his electrometer, when, Mr. Sokolow says, a ball of fire as big as his fist darted from the rod into the professor's head. He fell back dead. A red spot was found on his forehead, the shoe of his left foot was split open, and the skin was burned in a few places on his body.

Dr. Franklin immediately turned his thoughts to the application of his great discovery to some useful purpose, and suggested the lightning-rod, by which the thunderbolt is drawn in silence from the clouds, and the most dreaded of all the forces of nature is robbed of its terrors.