ROMANCE OF THE STEAM ENGINE.

ARTICLE XXIII.

STEAM NAVIGATION.

We have already traced the rise and progress of the steam engine from the toy of Hero to the splendidly finished engine of the present day. We have also described its application to working mines, and operating machines in all branches of the manufacturing arts, and also to locomotion on railroads. With this article we will close the series for the present.

The application of steam to move vessels, for navigating rivers, lakes, and seas, has been the means of bringing distant nations into more rapid and familiar intercourse, and it has extended the boundaries and improved the facilities of commerce.

We do not consider the successful application of steam power to navigation such a great invention as so many writers have held it up to be. The fact is, the power of steam was proposed for propelling vessels nearly a century before it was finally accomplished, and many experiments were also made, and it was not until the steam engine was perfected that success attended such efforts. The improver of the engine, therefore, deserves the most credit for this system of navigation.

In 1726 a Dr. John Allen, of London, published a pamphlet in which he proposed to propel a boat by a jet of steam flowing out at its stern. In 1737 Jonathan Hulls, of London, patented a mode of propelling boats by stern wheels, using the power of steam in an engine to drive the wheels. In 1782 the Marquis of Joffrie experimented with a boat 140 feet long, on the river Loire, at Lyons, France. He employed paddles revolving on an endless band, driven by a rude engine. We think this was the first steamboat experimented with. In 1784 James Rumsey, of Virginia, and John Fitch, of Connecticut, experimented with steam in moving boats. The former applied the power of steam to force a jet of water out at the stern of a vessel; the latter employed a series of vertical paddles alongside his boat, giving them a motion like that of rowing by hand. It is also stated that Fitch tried the paddle wheel and screw in some of his experiments. About the very same period, Patrick Miller, of Scotland, also made several experiments with stern wheels for a propeller, using a small steam engine to drive it. Stevens and Evans also made experiments with steamboats, between 1800 and 1804, but they ended with experimenting. It was Robert Fulton who successfully established steam navigation, in 1807. His boat, called the *Clermont*, was built in New York, under his directions; the funds for this purpose were furnished by his friend and patron, Chancellor Livingston, and the engine was built by James Watt, at Soho, England, and sent out by a sailing vessel.

Robert Fulton was born in Lancaster county, Pa., in 1765. He received a tolerable common-school education, and having exhibited a good taste for drawing, he devoted himself to painting portraits and landscapes as a profession. The spirit of mechanical invention, however, was upon him, and he gave early indications of genius in designing and constructing machines. In search of health he visited England when he was 21 years of age, and was kindly received by West—the great American painter—who was an acquaintance of the family. He made England his home for several years, and became a civil engineer. While engaged in this profession, his attention was directed to steam navigation for canals, and this subject took such complete possession of his mind that it almost excluded everything which did not bear upon it. He made neat drawings of steamboats, and endeavored to induce several men of capital to assist him in building a boat; he even solicited Napoleon to furnish him with means to construct one for the French navy. This great conqueror, although he was a master in the art of war, had very low notions of new inventions, so he considered Fulton a sort of fanatic and dismissed him. At length our inventor found a far-sighted, liberal friend in his countryman, Mr. Livingston, the American minister at Paris. When Fulton explained his designs to him, he at once appreciated their merits, sent the inventor to order an engine from Bolton & Watt, then dispatched him to New York, to build a suitable boat, which was named the *Clermont*. It was 160 tons burden; the engine had a cylinder 24 inches in diameter and a stroke of 4 feet. This boat started on her first voyage to Albany, N. Y., on the 10th of September, 1807, amid the cheers of wondering spectators. She made the trip of 150 miles in 30 hours, and from that day navigation by steam power has never ceased—this trip of the *Clermont* established steam navigation forever.

Robert Fulton was tall and slender in form, his face was handsome, and his manners gentle and kind. He died in New York on the 24th of February, 1815, from a severe cold which he contracted by exposure in crossing the Hudson river a short time previously, when it was full of ice, which detained him on it for several hours. He lies buried in Trinity churchyard, in the vault of his wife's relations—the Livingston family.

Ozone in the Atmosphere.

The following very interesting extracts on this subject are taken from a lecture by Professor E. Frankland, F. R. S., lately delivered before the Royal Society, and published in the *Chemical News*:

Hydrogen is capable of uniting with one equivalent of oxygen, forming water; with two equivalents of oxygen to form binoxyd of hydrogen; and with three equivalents to form "ozone," or, at all events, to form teroxyd of hydrogen, the existence of which is theoretically indicated, if ozone be not this very compound. What is this ozone? Some chemists suppose it not to contain hydrogen; others think it does contain hydrogen; and a series of analyses certainly did seem to prove that hydrogen, in the proportion I have stated, was a constituent of ozone. Now, ozone is produced in two or three different ways. One of the most peculiar is by means of the electrical machine. There is a peculiar odor in the neighborhood of an electrical machine when worked, and that odor is usually supposed to be due to ozone. It is caused by electric sparks passing through the air. We can collect this ozone in a variety of ways; but before doing this, I must refer you to the liquid contained in this glass vessel, which furnishes a very delicate test for the presence of ozone, and of other matters, too, as we shall presently see. It consists of a solution of iodide of potassium and starch. Ozone, containing as it does, three equivalents of oxygen, readily gives up oxygen, and it is capable, in this way, of oxydizing the iodide of potassium and converting the potassium into potash. The iodine thus liberated forms an intense blue solution with the starch. Here I have a Ruhmkorff's coil, which will give us a series of sparks. You see by the working of this air pump the so-called ozonized air passes through the liquid which becomes blue. You see we have now got a very decided blue coloration here. That is one mode by which ozone is produced; but we shall see that the blue color is not entirely due to the presence of ozone. Now, another mode for the production of ozone is by placing moist phosphorus in a close air jar. Here is some filter paper which has been imbued with the solution of iodide of potassium and starch, and which will become blue when it is plunged into this vessel containing ozone produced by this process. This constitutes what is generally known as the usual test for ozone in the atmosphere. Then we have another mode of producing ozone, and that is by electrolysis. When water is mixed with some highly oxydizing substance, such as chromic acid, we have this ozone produced when the water is decomposed by the current of electricity. It was from this source that ozone was produced for analysis, and it was from this that the formula I have here used was formed—namely, HO_3, three equivalents of oxygen and one of hydrogen.

Ozone, as I have said, is supposed to be present in the air, and many very careful observers are at the present time making observations upon the relative quantities of ozone present in the air. Papers of this kind [exhibiting ozone papers] are exposed to the atmosphere for certain fixed and definite lengths of time, the amount of blueness which they manifest in that time is carefully noted, and the intensity of this blue color is supposed to represent the comparative quantity of ozone present in the air. Now, it is greatly to be regretted th t such an amount of labor should be expended upon a matter which is utterly and entirely valueless, because this so-called "test" for ozone is really only a test for a great number of things which may—nay, do—exist in the air, and from which ozone may be really absent. We may say that there is not, up to the present time, a single experiment which demonstrates that ozone is present in the atmosphere; and certainly these tests, so far from proving its existence, do not even infallibly demonstrate the presence of an oxydizing influence in the air. It is quite possible that this blueing of the paper may be produced in a condition of the air very different from that in which ozone is present. Ozone being a highly oxydizing substance, is supposed to decompose organic impurities in the air, and therefore the air which contains the largest quantity of this ozone is supposed to be the most wholesome. You have only to have present, in the air, some acid gas—you have only to go into the neighborhood of some chemical works, for instance, where hydrochloric acid gas is evolved—and you will there have plenty of these manifestations of the presence of ozone. Here we have some solution of iodide of potassium and starch and I acidify it with acetic acid. You see we have abundance of acetic acid indicated, but it is said that ozone is never present in this part of London. The liquid has become of a dark blue color. The reason is, that the iodide of potassium which is contained in this liquid, and in all these test papers, is decomposed by acids, and hydriodic acid, a compound of iodine and hydrogen, is immediately formed. It is only necessary to bring this hydriodic acid in contact with free oxygen, when the hydrogen is oxydized and the iodine is liberated; so you see this so-called "test" for iodine is perfectly unreliable.

Patents in the Seceding States.

During the past three months we have had a number of applications from persons in high positions residing in the Southern States, soliciting our cooperation in the establishment of a patent system in the seceded States. Our reply has been: "When our government and other nations acknowledge your Confederacy as one of the national powers, we shall be ready to establish a branch of our business at your capital; but until then we must decline any recognition of your power to grant patents, or your right to disregard the claims of patentees whose rights are secured to them under the federal laws, whether the inventor resides North or South, or in a foreign land."

We have received circulars from one or two Southern cities, soliciting inventors to protect their inventions under the provision which the Southern Confederacy enacted on the 4th of March, and which was published on page 202, present volume of the SCIENTIFIC AMERICAN; and we presume Northern patentees have pretty generally received such circulars. In fact, we know many have, for a number have asked our advice as to the propriety of securing their inventions in the South.

To those who have written, we have told to wait until we advised them further; and this answer will apply to thousands more who have not yet put the inquiry, but who are not less desirous to know our opinion.

Brown's Breech-Loading Cannon.

We learn from the Providence *Journal* that our old friend, Captain Brown, of Warren, R. I., has constructed a working model of his breech-loading cannon, which was illustrated on page 240, Vol. III., of the SCIENTIFIC AMERICAN, which he has introduced to the attention of the authorities of Rhode Island. The *Journal* says:—

This model works very satisfactory, and the patentee is well convinced that the larger the caliber of the piece, the more satisfactory it will work; and he is desirous of immediately making one that will throw a six or eight-pound ball. The claims made for this new piece are, the easy manner in which it is worked and the rapidity of its discharges, the model showing that it can be safely discharged over twenty times each minute.

The Patent Office Safe—A Good Time to Apply for Patents.

There is no longer the least apprehension for the safety of the Patent Office, and business is transacted in the various departments with nearly its usual alacrity. The number of applications for patents is not so great, in times like these, as usual, while the clerical force of the Patent Office is not diminished. This gives the Examiners more time to investigate into the novelty of inventions brought before them, and at the same time to keep their work well up.