ROMANCE OF THE STEAM ENGINE.

NUMBER II.

PORTA, DECAUS AND KIRCHER.—In our last article, we presented an illustration of Hero, the Grecian's steam engine, and stated that he had left manuscripts behind him that described his inventions. His work was called "Spiritalia," and when learning revived in Europe, in the fourteenth century, it formed the text book for the ingenious men who began to study mechanism. A void of many centuries occurs in the history of the steam engine, which may be accounted for by the turbulence of those ages. Among the most tangible accounts which we have of the application of steam, after Hero, was by Anthemius, an architect and mathematician, who lived in Constantinople in the early part of the sixth century. Having a quarrel with Zeno, a celebrated orator, the latter vanquished him in "tongueology," but the gabbler was ultimately defeated by the master mechanic, who lived in an adjacent house. In a lower room, Anthemius arranged several cauldrons of water, each of which was covered with the wide bottom of a flexible tube which tapered towards the top, and which were craftily conveyed among the joints and rafters of Zeno's house. When the cauldrons were heated, the steam arose through the pipes, and acting upon the confined air, let off several discharges which shook the building and created such horrible sounds that the superstitious inhabitants thought they resembled the groans of suffering ghosts. The orator was made to succumb; so he went to the Senate and in tragic style declared that "mere mortal must yield to the power of an antagonist who shook the earth with the trident of Neptune."

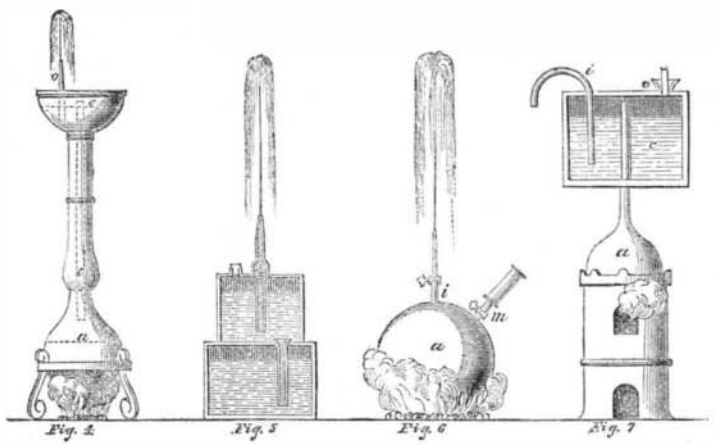
Fig. 4 Fig. 5 Fig. 6 Fig. 7

Again, about 1125, as related by the chronicler, William of Malmsbury, there was in a church at Rheims, in continental Europe, an organ invented by Gerbert, a professor in the schools, which had brazen pipes that emitted modulated tones by air which was expanded by heated water. This was certainly the first Calliope.

The next caloric inventor was Jerome Cardan, of Pavia, who lived in the early part of the sixteenth century. He was one of the most learned men in Europe, but a consummate quack and deeply superstitious. At the same time he was a distinguished mathematician and physician. In the writings which he left behind, he describes how a vacuum may be made in a vessel, by condensing steam; and he left a rude diagram of a machine to be moved by the heated air which escaped from the fire on the hearth—the well-known smoke-jack, and the first hot air engine.

About this time (1540) practical mechanics began to receive greater attention. Besson, who taught philosophy at Orleans, in France, made a number of machines, the operation of which he explained in his lectures. In 1588, Agostino Ramelli published a book in Paris in which several machines were described, and his writings show that he was engaged, like many persons in our day, in efforts to invent a perpetual motion—that *ignis fatuus* of mechanical ignorance.

The next steam inventor is Baptista Porta, a Neapolitan nobleman, who invented the magic lantern, and who was a man of extensive learning and great mechanical attainments for that era—the sixteenth century. In the salubrious and warm clime of southern Europe, the early steam inventors had their attention drawn to the production of artificial fountains, with their cool and sparkling waters adorning the shady grove, the colonnade and piazza. In Fig. 7, we have an illustration of Porta's steam fonntain; *a* is a retort or steam vessel, having its neck inserted into the bottom of the cistern, *c*, which is nearly filled with water by the funnel, *e*. A pipe, *o*, passes through the corner; the steam rises into the upper part of the cistern and by its expansive pressure it forces the water, in a silvery shower, up through the pipe, *o*, in its cover.

Figs. 5 and 6 represent the steam fountains of Solomon Decaus, who published a book on mechanics in 1615, at Frankfort, Germany, but who was a native of France, an engineer and architect of great acquisitions. Water is introduced into the copper globe, *a*, by the funnel. A pipe, *i*, is inserted into this globe. When fire is applied to the globe and steam is generated, it forces the water through the tube, *i*, by its expansive pressure, as the bottom of the exit pipe extends down below the surface of the water. The great idea of Decaus, however, was to generate steam without fire by the heat of the sun, so as to make an artificial fountain, as shown in Fig. 5, which represents a cistern partly filled with water, and having a lens inserted in it, for concentrating the rays of the sun to generate vapor in the upper part of the cistern, the elastic pressure of which forced the water up through the tube. The lower cistern has a pipe which leads to the upper one, in which is a valve opening upwards. A lens is made to concentrate the sun's rays upon this cistern; the water flows into the upper one by the pressure of the vapor, and it cannot return owing to the valve in the lower pipe. These contrivances never reached a higher position than curious steam toys.

Fig. 4 represents the steam fountain of Kircher, a Jesuit, and professer of philosophy in Rome, in 1656. *a* is a boiler containing water; it is connected by a pipe, with another close vessel, from which a pipe, *o*, rises into the atmosphere. Fire being applied to the boiler, steam issues from its pipe and fills the upper part of the cistern, where its expansive pressure forces the water it contains in a jet up into the atmosphere. The principle is the same as Porta's apparatus, but is far more elegant in construction, and it was practically applied.

The solar fountain of Decaus exhibits great ingenuity and much reflection. His method of concentrating the heat of the sun by lenses, for generating steam, has been proposed to us quite a number of times within the past few years.

IS HYDROGEN A METAL?

Though hydrogen is the very lightest gas known, and though, when uncombined, it has never been condensed to either the liquid or the solid state, some of its properties have led to the conjecture that it is probably a metal. In combination with nitrogen, as ammonia, it forms an amalgam with mercury, as is the case with most of the metals. The following conclusions from some experiments of Herr Magnus, of Berlin, strengthen the opinion that hydrogen is a metal.

His apparatus consists of a glass tube within which a thermometer is fixed, which can be observed from outside. The tube is filled with gas, more or less condensed, and the upper portion of the glass tube is maintained at the temperature of boiling water, while the ambient air is constantly at 60° Fah. Only the upper part of the tube is heated, in order to avoid, as much as possible, ascending currents. The state of the thermometer in the different gases is compared with that at which it stands in a vacuum. The following are the results obtained:—

1st. The temperature of a thermometer placed in a space heated above, varies with the different gases contained in the space.

2d. It rises higher in hydrogen than in any other gas.

3d. It is much higher in hydrogen than in the vacuum, and much more so if the gas be condensed.

4th. Hydrogen therefore conducts caloric like the metals.

5th. In the other gases the temperature rises less than in the vacuum, and it rises much less when the gases are denser.

6th. It does not follow that these gases have no conducting power, but only that it is so feeble that the diathermancy of the gas disguises and annuls it.

7th. The extraordinary conductibility of hydrogen is evident not only when this gas is freely mobile, but also when it is enclosed in the eider down, or in any other sufficiently porous substance.

8th. This property of hydrogen is a fresh proof of its analogy with the metals.

9th. Hydrogen conducts not only caloric but also electricity better than all other gaseous substances.

STRINGENCY IN THE MONEY MARKET.

Two weeks ago we alluded to the money market as being in an unsettled condition, and, in consequence, we were obliged to allow from 10 to 15 per cent discount on bills of banks located in remote portions of the country to get the currency changed into gold or city money.

We had hoped before two weeks elapsed to have been able to record a better state of affairs; but, at the time of going to press, we regret to state that, instead of a relief in this direction, there exists a greater stringency in the market, and a more general depression of business in mechanical and manufacturing departments than at any period since 1857.

How long this state of affairs may continue, the most sagacious business men in this city do not predict; but we trust that the storm is at its hight, and that very soon the portentous cloud which overhangs the destinies of this country will have passed away. We hear of large manufacturing establishments in this city and vicinity discharging their employés by the hundred; and, while the employer is not too blame for curtailing his expenses, we feel anxious for the poor laborer and his family, who are thus deprived of their resource for sustenance as the frigid winter months wear on.

For the sake of humanity, we hope the workshop of the mechanic may be made to ring, and the shuttle of the manufacturer to traverse again before the pinching cold weather of January is upon us.

In this connection, we would state that inventors seem to enjoy immunity from the severity of the times, and we trust they may never experience such vicissitudes as have so suddenly come over kindred avocations. As an evidence of the activity among inventors, and the prosperity of one department of our government, we would state that from this office alone we paid into the Treasury last week, on account of patent business, nearly $2,500. On Friday, December 7th, we paid $1,480 for fees on cases sent to the Patent Office on that day.

In closing, we would remind our distant patrons of the offer made two weeks ago, to take their bank bills at par for subscriptions or patent business, and, at the same time, would remark that we very much prefer to receive drafts on New York, or bills on banks located in the vicinity of this city; and it is only to those who reside at remote distances that this offer to receive their currency at par is made.

AMERICAN street railroads are highly recommended by the London *Times*. It asserts that they are more safe and far more convenient than cabs or any other common mode of street travel in the British metropolis. It seems that the street railroad in Birkenhead, England, has been quite successful. Our countryman—G. F. Train—has obtained a grant from the Town Council of Birmingham to lay down a street railroad in that city.

THE new steam Fire Department of Boston is fully organized, and there is not a single hand engine in use throughout the entire limits of the city.