secured. An illustrated description of this apparatus will be found in another column.

AMMONIA AND ITS USES IN THE ARTS.

Ammonia is, in many respects, a peculiar substance, and much might be said of its composition and chemical relations to other bodies. Our purpose is, however, in the present article, to give only a brief and popular account of its manufacture on an extensive scale, and to say something of its important applications in the arts.

Ammonia has been long known under various names, *aqua caustica*, spirits of hartshorn, sal volatile, and lastly, ammonia, from Ammonium, a district in Africa, taking its name from the Temple of Jupiter Ammon, the salts of ammonia having been formerly obtained there.

The production of ammonia is now very large and necessarily so, as the already large demand for it in the various arts is constantly increasing.

Ammonia has been made by the direct combination of the gases which compose it, namely, nitrogen and hydrogen, but this method has never been made profitable in its manufacture. It is most cheaply and extensively obtained as a collateral product in other manufactures.

It is one of the by-products in the distillation of coal in gas works, and also in the manufacture of boneblack. It has also been made under patent process, which consists in distilling a mixture of two parts of guano with one part of lime, or other caustic alkali, the gaseous ammonia being conducted into water which is thus saturated with it, forming a commercial *aqua ammonia*.

Several other patents have been granted on processes for manufacturing ammonia. One of these is a method for extracting ammonia from gas water. The gas water is put into a retort with slaked lime, and distillation performed as in the guano process.

An improvement was made and patented, 1838, for the production of ammoniacal liquor from gas water, which was a great advance on the old methods, as it enabled the product to be obtained in a concentrated form.

One of the most recent sources of supply has been found in the boracic acid manufactories of Italy, which formerly allowed enormous quantities to be wasted. It is now estimated that over one million pounds of ammoniacal salts are produced by these establishments.

In the beet-root sugar manufacture, large quantities of sulphate of ammonia are allowed to go to waste.

Ammonia has been proposed as a means of generating motive power, but the experiments hitherto tried in this field have not proved very successful, though the liberation of this gas from its salts, in a close vessel, may be made to generate an enormous pressure, and its ready absorption by cold water renders the application of the condenser perfectly easy. One of the obstacles met with in these attempts has been the difficulty of constructing cheap machines out of materials which are not chemically acted upon by this gas, but it still seems to us that the method might be advantageously applied to the generation of motive power under circumstances where steam is not admissible. We do not, however, believe it can be worked as economically as steam for many of the purposes for which it has been proposed.

Machines for manufacturing ice, employing liquid ammonia, have been constructed, on the principle, that when liquids expand into gases, they absorb heat from surrounding bodies. The same principle has, however, been more cheaply applied in the use of volatile hydrocarbons as a substitute for the liquefied ammonia. The details of these different machines are, of course, dissimilar, but the general principle of their operation is the same.

To specify the widely extended and various uses to which this substance is applied in the arts, would compel us to greatly lengthen this article. Suffice it to say, that it is one of those essentials to the present status of the industry of the world, the absence of which would be felt scarcely less than soda or sulphuric acid.

THE EXHIBITION OF THE AMERICAN INSTITUTE.

The fair of the American Institute was duly opened at the Empire Skating Rink, Third avenue, between Sixty-third and Sixty-fourth streets, on the 8th inst., and although things are yet in a somewhat chaotic condition—the department of machinery especially—the signs indicate a brilliant display. The confusion is not due to want of exertion on the part of the managers so much as to the dilatoriness of exhibitors.

None of the machinery was running at the time of our going to press, though there will be no long delay.

None of the departments was complete at the time of our visit; the art department being specially meager. There are one or two crayon portraits worthy of special notice, but beyond this and some excellent photographs, there was very little worth seeing.

The exhibition of the American Association of Wool Manufacturers is undoubtedly destined to be one of the most interesting and attractive features of this fair. The following mills are already represented: The Lawrence and Pacific Mills, Lawrence, Mass.; Hamilton Woolen Co., Lowell, Mass.; Wm. Duncan & Son's Mills, Franklin, N. J.; Eddy & Son's Mills, Fall River, Mass.; Lawrenceburg Woolen Mills, Lawrenceburg, Ind.; Hockanum Company, Rockville, Conn.; Harris Woolen Mills, Woonsocket, R. I.; Weybosset Woolen Mills, Providence, R. I.; Central Woolen Mills, Uxbridge, Mass.; Elba Woolen Mills, Providence, R. I.; Rock and New England Manufacturing Companies, Rockville, Conn.; American Mills, also of Rockville, Conn., Kernan and Helm, Utica, N.Y., and others whose goods were not yet displayed, and the names of which we could not learn. The goods in this department already on exhibition are such as to excite the pride of every one who has the prosperity of American industry at heart.

In the machinery department the only things which were arranged were two fine cases of saws, one from Hoe & Co., New York city, and the other from the American Saw Co., also of this city.

Passing from this department we observed a fine collection of agricultural machinery, which we will notice more in detail hereafter. Near this collection stands a beautiful show table of paints, exhibited by Devoe & Co., 117 Fulton street, New York. A great deal of taste is displayed in the arrangement of this table, and the samples of colors exhibited are very fine.

The soda-water fountain exhibited by John Matthews, of this city, is one of the most beautiful designs we have ever seen.

The silk department will attract much attention. Although necessarily much smaller than the exhibition of woolen goods, it is, considering the comparatively recent period since the silk manufacture could be ranked as an American industry, a very remarkable display. Among the establishments represented here we notice P. G. Gimraud, Paterson, N. J.; Frederick Bane, Schoharie, N. Y.; Dale Manufacturing Co., Paterson, N. J.; Cheeney Bros., Hartford, Conn.; W. H. Horstmann & Sons, Philadelphia, Pa.; J. S. Shafter, Paterson, N. J.; and the Oneida Community, of Oneida, N. Y.

We shall give more detailed attention to the various departments in future issues, and we congratulate the managers of the fair on their prospects of success. The exhibition will, undoubtedly, be one of the best ever held under the auspices of the American Institute.

On Friday evening the fair was honored by a visit from President Grant, who was escorted through the several departments by the Hon. Orestes Cleveland, Chairman of the Board of Managers. He spent considerable time in the woolen department, and he was apparently well pleased with the numerous beautiful products of American industry to be seen both there and in all the other departments of the fair. His presence created a great deal of enthusiasm among the large assemblage, and he was repeatedly cheered, while the band played "Hail to the Chief," and other appropriate airs.

AN EXAMPLE FOR YOUNG MEN.

The career of Gen. John A. Rawlins, the late Secretary of War, who paid the forfeit of life in the service of his country, is a striking illustration of the fact that honor and fame are open to all in this country who unite ability with ambition and integrity. Gen. Rawlins was the son of a poor charcoal burner, who resided at Guilford, Ill., and was compelled to follow his father's trade. In the mean time he was ambitious to rise above his humble position, and earnestly applied himself to the study of books, and was finally admitted to the bar at Galena, where he not only gained an honorable practice, but won a good name, and a host of true friends.

At the outbreak of the war, Grant discovered the sterling merits of this man Rawlins, and from that time they became inseparable friends and co-laborers in the nation's cause. Grant became President, and Rawlins was made Secretary of War—fulfilling all duty assigned to him ably and well.

He died poor, and the keen instincts of our people at once appreciate the character and services of such a man. He could have made himself rich through the many opportunities that came in his way as chief of Gen. Grant's staff, but, like his illustrious superior, he was above the temptation to abuse the confidence of a sacred trust—a rare thing in these days.

The widow and children of the noble Rawlins are left poor by his death, but a purse of $50,000 has been subscribed, or nearly so, in this city to relieve them from want. If republics are ungrateful the people are not.

RAINLESS DISTRICTS---FREAKS OF THE WEATHER.

In several parts of the world there is no rain at all. In the Old World there are two districts of this kind: the Desert of Sahara in Africa, and in Asia part of Arabia, Syria, and Persia; the other district lies between north latitude 30° and 50°, and between 75° and 118° of east longitude, including Thibet, Gobiar, Shama, and Mongolia. In the New World the rainless districts are of much less magnitude, occupying two narrow strips on the shores of Peru and Bolivia, and on the coast of Mexico and Guatemala, with a small district between Trinidad and Panama on the coast of Venezuela.

Per contra—the climate of the Khasia Mountains, which lie northeast from Calcutta, is most remarkable for the excessive fall of rain. An English traveler established the fact that in the month of August, 1841, there fell 264 inches of rain. This great rain fall is attributed to the abruptness of the mountains that face the Bay of Bengal and the intervening flat swamp 200 miles in extent. It is not easy always to account for the erratic conduct of the weather upon any established scientific theory, for it is asserted that there is a district in Siberia in which, during winter, the sky is constantly clear, and where a particle of snow never falls.

THE ROOT STEAM ENGINE COMPANY are placing in the Fair of the American Institute, one of their 120-horse power boilers, which is exciting considerable interest among steam engineers. For safety and economy of fuel, large claims are made by the manufacturers. The Company is now composed of some of our shrewdest business men, who have placed sufficient capital at their disposal to enable them to fill extensive orders.

THE HUMBOLDT CENTENNIAL CELEBRATION.

Alexander von Humboldt was born in the city of Berlin on the 14th September, 1769. The occurrence of the centennial anniversary of the birth of this great man was commemorated in his native city by the dedication of a national monument with appropriate ceremonies. In New York city also, a colossal bronze, representing him in the prime of life, was unveiled. Professor Francis Lieber delivered an appropriate address in German, followed by one in English by Professor Doremus. Numerous German singing societies took part in the celebration, and a banquet was given at Irving Hall.

It was generally supposed that Humboldt was little known and not much appreciated by the people at large on account of the fact that his works are so learnedly written that they can only be perused by one who is already in possession of a considerable amount of scientific knowledge. No supposition can be more erroneous than this. In the winter of 1827–8 Humboldt delivered in his native city, Berlin, a course of sixty-one lectures, commencing November 3d and concluding on the 26th of April. These lectures formed, as it were, the first sketch of the "Cosmos," published subsequently, and were especially arranged for the people at large, those that had not enjoyed the advantages of higher education.

Some scientists of an inferior rank would perhaps have considered it beneath their dignity to appear as teachers. Humboldt did not, though he was then Baron, Chamberlain, Councilor, and confidential adviser of the king.

The inhabitants of Berlin and Potsdam all knew him personally, and showed him as much honor as to a king. With a slow but firm step, the head slightly bent forward, one arm at his back, holding a pamphlet, he was often seen passing through the streets. Wherever he appeared he was received by tokens of reverent esteem, the passers-by stepping aside through fear of disturbing him in his thoughts, and one was often heard saying to his neighbor, "There goes Humboldt."

The following instance goes to prove what reverence even the lowest classes paid him. During the time of the revolution, in 1848, a troop of bristly fellows stormed his house, ignorant of the fact that they were in the residence of the great *savant*: "I have no weapons, my boys; I am an unpretending philosopher, and my name is Humboldt"—uttered a small, bowed, and white-haired figure. "Back!" called the commander of the troop, "this is our great citizen Humboldt; four men remain before his house to watch that no wrong is done to him."

The following sketch of this great man is from the pen of Dr. Francis Lieber:

Who has not enjoyed the pleasure of finding the spots on the chart of human progress where you put down your finger and say, here is Aristotle, and here again; here is Hildebrandt, here is the conquest of Constantinople traced even in the discovery of our continent, even in Descartes and Bacon; here are the causes and the effects of the University; and to trace the lines of civilization radiating in different directions, from point to point? And this delight we may enjoy when meditating on the period of which Humboldt was one of the most distinct exponents. We enjoy it even now, although he has left us but yesterday; for God allowed to him days so long that he passed into history before he passed away from among us. Humboldt died as old as Sophocles.

Humboldt received the living traditions of the great circumnavigator, Cook, through Foster, Cook's companion, and lived to gather facts for his Cosmos from the latest reports of the geological surveys of our States. He lived when Voltaire died, and must have grown up with many French ideas floating around him, for Humboldt was a nobleman whose family lived within the atmosphere of the Berlin court; and he lived to witness the great revolutions in literature as well in Germany as in France and England. He lived when Rousseau died (the same year that Voltaire deceased), and must have remembered, from personal observation, that homage, which even monarchs paid (at a distance, it is true) to the Contrat Sociale, and he outlived, by some weeks, De Tocqueville. He lived through the period of the American Revolution, was a cotemporary of Washington and Adams, and a friend of Jefferson. He lived through the French Revolution and the age of the classic orators of Britain. He lived through the Napoleonic era and the resuscitation of Prussia and of all Germany. He studied under Werner, with whom mineralogy begins, and knew Houy. He knew La Place, survived Arago and Gauss, and worked with Enke. He lived with Kant, and knew Schelling and Hegel. He knew Goethe and read Heine. He read "Gibbon's Decline" as a work of a living author, and perused Niebuhr, and later still praised Prescott. He grew up in the Prussian monarchy according to the type of Frederic the Great, and with the fresh reminiscences of the Seven Year's War, and left it changed in army, school, government—in everything. He saw the beginning of the Institute of France, and lived to be considered by its associates as one of its most brilliant ornaments at its most brilliant period. He lived through the periods which distinctly mark the science of chemistry, from Lavoisier to Rose and Liebig. Humboldt was seventeen years old when the great king, perhaps the most illustrious despot of history, died so tired by the genius of his own absolutism that we cannot forget the words of the dying king; "I am weary of ruling over slaves;" and he lived through the whole period of growing popular sentiments and habits, of constitutional demands, and revolutionary, fearful conflicts. He wore the lace and ruffle of the last century, and the more practical dress of our times. Yet no one ever heard from him any useless regret for what had passed and was gone. I have heard him speak with warmth of noble things and men that he had known, but not with gloomy despair of the present or the future.

What an amount of thinking, observing, writing, travel-