

## RECENT EXPERIMENTS WITH "LAUGHING GAS."

Protoxide of nitrogen, or "laughing gas," the anæsthetic properties of which were discovered by Sir Humphry Davy, is used at the present time by a very large number of dentists for producing insensibility during the process of extracting teeth. But this insensibility cannot be prolonged for any great length of time owing to the fact that asphyxia is liable to supervene. For this reason, American surgeon dentists have succeeded in performing lengthy operations by means of this gas, only in producing short, but repeated anæsthesia, separated by intervals of sensibility. The reason of this is that anæsthesia can only be produced by making the patient respire pure protoxide of nitrogen, without any admixture of air; the result is that asphyxia is a concomitant of anæsthesia. The celebrated physiologist, M. Paul Bert, has recently been experimenting on this subject with a view of discovering some means of overcoming the latter difficulty, and obtaining from laughing gas anæsthetic effects that may be indefinitely prolonged, while at the same time they shall be absolutely free from any dangers arising from asphyxia. The results of his investigations were presented in a paper read before the French Academy of Sciences on the 11th of November. It is proper to remark here that M. Bert's experiments were made upon animals solely. The fact that protoxide of nitrogen must be administered in a pure state signifies that the tension of this gas, in order that it may penetrate in sufficient quantity into the organism, must be equal to one atmosphere. In order to obtain it, under the normal pressure, it is necessary that the gas be in the proportion of 100 per cent. But if we suppose the patient placed in an apparatus where the pressure may be carried up to two atmospheres, we shall be able to submit him to the desired tension in making him respire a mixture of 50 per cent protoxide of nitrogen and 50 per cent air; we ought then to obtain anæsthesia, while at the same time we maintain the normal quantity of oxygen in the blood, and consequently preserve the normal conditions of respiration. And this is just what happens. In M. Bert's experiments he tells us that he entered an apparatus constructed for the purpose, and there under an increase of pressure of one fifth of an atmosphere he caused a dog to respire a mixture of five sixths of protoxide of nitrogen and one sixth oxygen—a mixture in which, as may be seen, the tension of the laughing gas is precisely equal to one atmosphere. Under such conditions the animal fell, in one or two minutes, into a complete state of anæsthesia, and had it not been for its respiration, which was executed with perfect regularity, it would have seemed to be dead. This state was found to last for an entire hour without the least change; the blood preserving its red color, the heart its regular beats, and the temperature its normal degree. During this whole period, all those phenomena of life called vegetative remained intact, while all those of animal life were absolutely annulled. When the bag containing the mixed gases was at length removed, the animal was observed, at the third or fourth inspiration of pure air, to suddenly recover its sensibility, will, intelligence, and natural friskiness. This rapid return to a normal state, so different from what is observed on the administration of chloroform, is due to the fact that laughing gas does not, like the latter, form chemical combinations in the organism, but is simply dissolved in the blood. As soon as none of it longer exists in the inspired air, it rapidly escapes from the system, through the lungs, as analyses of the blood have proved. As a result of many very careful experiments, M. Bert states that he feels himself authorized to maintain that the use of protoxide of hydrogen is perfectly harmless; and furthermore, he strongly recommends surgeons to use this gas under pressure, with a view of obtaining its anæsthetic effects as long as possible. By measuring, as above indicated, the barometric pressure and the centesimal composition of the mixture, so as to have for the protoxide of nitrogen the tension of the atmosphere, and for the oxygen at least the normal tension in the air, they will obtain a state of insensibility and a muscular resolution as complete as they desire, with an immediate return to sensibility and perfect state of well being, on removal of the anæsthetic agent. The sole difficulty in the way relates to the apparatus necessary to make the application of the anæsthetic under tension. For army purposes this is insuperable, but in cities the difficulty is easily remedied, for in such places compressed air baths are always obtainable, and in fact might be easily constructed in the surgical wards of hospitals at small expense. This, however, is a matter of secondary consequence, the solution of which remains with surgeons themselves; to whom, as well, it belongs to resolve the numerous questions of detail that always accompany the application of a new therapeutic agent.

## A PAPER OBSERVATORY DOME.

An astronomical observatory has recently been erected for the Rensselaer Polytechnic Institute, at Troy, in the maturing of the plans for which Prof. Dascom Greene has introduced an improved method of constructing revolving domes. In making the preliminary inquiries, he ascertained that a dome of the required dimensions, constructed in any of the methods in common use, would weigh from 5 to 10 tons, and require the aid of cumbersome machinery to revolve it. It therefore occurred to him to have the framework made of wood of the greatest lightness consistent with the requisite strength, and to cover it with a paper of a quality similar to that used in the manufacture of paper boats; the advantages in the use of such materials being that they admit of great perfection of form and finish, and give extreme lightness,

strength, and stiffness to the structure. A contract was accordingly made with a well-known firm of builders of paper boats, for the construction of the dome, and the undertaking has been carried out with great skill and success. The dome is a hemisphere, with an outside diameter of 29 feet. The framework is covered with paper about one-sixth of an inch thick after drying, and is of a superior quality, manufactured expressly for the purpose at Westfield, Mass.; it has a structure as compact as that of the hardest wood, which it greatly excels in strength, toughness, and freedom from any liability to fracture. The weight of the dome and its appurtenances, as completed, is about 4,000 pounds. It is supported on six 8-inch balls, which roll between grooved iron tracks, and can be easily revolved by a moderate pressure applied directly, without the aid of machinery.

## THE WOODBURY PLANING MACHINE CASE.

At Boston, in the United States Circuit Court, January 28th, 1879, Judge Lowell rendered a decision in this important and long contested patent litigation. He decides that the Woodbury patent is invalid. A gigantic monopoly thus probably receives its death blow, for it is not likely that the Supreme Court will reverse the decision, though an appeal still lies to that tribunal. The enemies of our existing patent system who are claiming that the present rights of inventors shall be abridged, may see, from the principles laid down in this important decision, that the present laws as they stand afford the public ample security against the triumph of invalid patents or the progress of unauthorized patent monopolies.

The leading features of the Woodbury case, as found in Judge Lowell's decision, are as follows:

The patent was issued to Joseph P. Woodbury, April 29, 1873, and is for an improvement in planing machines, by which flat bars are placed before and behind the cutters to keep the stock firm during the operation, instead of the rollers, which were used by Woodworth, the inventor of this class of machines. This change, though slight, has proved to be of great value, and is now in general use; and this suit is defended by an association of persons who are interested to continue such use. The patentee is dead, and the plaintiffs are a corporation to whom he had assigned his patent.

The history of this grant, which was made twenty-five years after it was first applied for, and twenty-seven years after the invention was completed, is remarkable. The inventor made application June 3, 1848, and appointed an attorney, but did not give him all the usual authority. The power was so worded as not to enable him to withdraw the application. The office rejected the application February 20, 1849, and nothing further was done until October, 1852, when the attorney withdrew the application, and received back \$20, of which Woodbury had no notice. In February, 1854, Woodbury instructed another solicitor to call up and prosecute this rejected application. There was, at that time, a rule in the patent office, that an application which should not be renewed or prosecuted within two years after it had been rejected or withdrawn, should be conclusively presumed to have been abandoned.

But in revising the patent laws in 1870, Congress enacted "that when an application for a patent has been rejected or withdrawn, prior to the passage of this act, the applicant shall have six months from the date of such passage to renew his application, or to file a new one; and if he omit to do either, his application shall be held to have been abandoned. Upon the hearing of such renewed applications, abandonment shall be considered as a question of fact."

Woodbury's application was thereafter revived, and after a long contest before the patent office, a patent was issued in the name of the inventor, dated under date of April 29, 1873. Meanwhile, the invention had for many years been brought into general public use, for as no patent existed all the lumber workers enjoyed the free use of the invention. The Woodbury party then began suits for damages against those who continued the use after the issue of the patent. Nothing could be collected for the use prior to the patent. The defense of Keith was, that Woodbury was not the original and first inventor, and, therefore, that the Woodbury patent was invalid. It was successfully shown that the machine built by one Anson, at Norwich, Connecticut, anticipated the invention of Woodbury.

The invention of Woodbury was made in 1846, and the machine of Anson was made in 1843. Of the date there is no doubt, for Anson applied for a patent on his invention in 1844. His machine was organized to mould or "stick," as the witnesses call it, sashes for windows, and similar articles, was adapted to planing, and was used for planing slats for blinds. There is no doubt that Anson's machine had bars instead of rollers, for he says so in his specification. The machine has been running ever since, and was produced in court.

"Two points," says Judge Lowell, "are taken against this machine. 1st. That the bed is not sufficiently solid to answer the purpose of Woodbury's bed, which is to resist firmly, like an anvil, as he says, the blows of the cutter. Upon the evidence, and upon inspection, I think the bed is a solid bed, within the meaning and use of the Woodbury machine, for all purposes of planing such stock as was likely to be planed upon it. And if the machine were to be enlarged to do general planing work, I see no reason to suppose that a similar bed, modified only as any mechanic would modify

it, would not answer the purpose. The solid bed was not new with Woodbury, but was part of the Woodworth organization, which was the starting point of all these machines, and its benefits were well known and likely to be adopted by Anson. 2d. The other question is whether the bars which Anson made instead of rollers, had a yielding pressure. If not, they would not work on an ordinary planing machine, though they might possibly do in a small machine for special purposes. The machine in court has a yielding pressure, by means of weights, which allows the bar to give about three-eighths of an inch. Mr. Waters says about three-sixteenths of an inch: but he is considerably under the mark. To all appearance this organization is as old as the rest of the machine; but as the question of novelty on the part of Woodbury depends upon whether the weights were introduced thirty-five years or thirty-three years since, the appearance is of no great significance. The witnesses all think that the machine has remained unchanged in this particular from the beginning. It seems probably that any one who substituted bars for rollers would make them yield, because the rollers of Woodworth's machine were made in that way. It was not the yielding which was new, but the substitution of bars for rollers. The distinguished expert of the plaintiffs says, 'I have never seen a Woodworth planing machine organized with either rollers or bars to bear down the rough stock upon the bed-piece, by acting upon the rough surface of the stock, that was not so constructed as to allow the roller or bar, as the case might be, to yield to the inequalities almost always existing in sawed lumber; nor do I ever expect to see such a machine in practical use.' His meaning is, that the machine would stop whenever a board having the usual inequalities was attempted to be passed through it.

"In a machine like Anson's the difficulty might not present itself so often, or so soon, but I should suppose it would make itself felt sooner or later, and would need to be remedied before the machine had been run for a day.

"The witnesses, sixteen in number, are all on one side, and include, apparently, all persons now living who ought to be called. They testify from their recollection, with more or less positiveness, and with apparent fairness. None of them points to any change by which the pressure bars were made yielding after the machine was finished in 1843, but, as I before said, they all think them unchanged.

"Against this there is the evidence, which is entitled to much weight, that the drawings accompanying Anson's application for a patent do not show any opportunity for a yielding pressure, or but little. The model is somewhat damaged, and the suggestion is made that it may have been tampered with. As it appears to-day there is some play to the rods of the pressure bars.

"I do not think this negative evidence sufficient to discredit the recollection of the witnesses. The patent which Anson asked for had nothing to do with the bars, and there is no reason to suppose that he understood that there was any such advantage in bars over rollers as Woodbury saw and made known. He was not concerned with the particular matter of a yielding pressure bar; but if he made it to yield, he made the thing which Woodbury is, by a very proper and indeed necessary fiction of the patent law, presumed to have had knowledge of; and, therefore, when Woodbury pointed out the great advantage of this organization, he was merely, in intent of law, applying an old machine to a more extensive use. I believe him to have been an original and meritorious inventor, but of a change which was not difficult to make or to invent, and of which, as it turns out, he was not the first inventor. Bill dismissed with costs."

## A NEW AND IMPORTANT MINERAL.

About the first of December of last year, Dr. Henry Wurtz received a specimen of a newly discovered mineral, said to occur in considerable quantities in Utah, where it is found in veins of pipe clay. This mineral is of a dark brown color, and waxy feel, and is easily impressed by the finger nail. Dr. Wurtz made a preliminary examination, and found that it fuses at a little over 70° C., and evidently consists of a number of homologues of the paraffine series, such as those found in Europe in Moldavia and Galicia. It is the first deposit of the kind known on this continent, and may prove of great value to that section of the country.

Cold ether dissolves about 12 per cent of a soft paraffine of greasy consistence and having the color of burnt sienna. It becomes transparent on melting and resembles the urpethite of Johnston.

Boiling ether dissolves about 37 per cent, and leaves on evaporation a hard, waxy material, somewhat darker than the first portion. It is probably to be classed with ozokerite, notwithstanding its apparently greater hardness.

The third portion, insoluble in boiling ether, and comprising about 52 per cent of the original mass, is very dark brown and decidedly harder than beeswax. It appears to approach in character the Moldavian species of zietriskisite, but its melting point is somewhat lower. Lack of sufficient material has hitherto prevented Dr. Wurtz from determining the various points of interest with satisfactory precision.

C. F. K.

A recent number of the *Indian Tea Gazette* reports that a new species of tea shrub, resembling that which grows in China, has been discovered in Armenia, near Trebizond. The peasants pick the leaves and dry them in the sun, and large quantities have been sent to Persia, where the new product is highly appreciated.