described, and each only adds to increased demands. Ohio has over 4,000,000 acres wood land, yet the ever-increasing demand for railroad purposes alone, if supplied entirely from our forests, would leave us without a single stick to mark the existence of our once dense forests.—*Cincinnati Commercial.*

Adulterations of Carpet Yarns.

The use of cow hair, buffalo hair, camel's hair, and Russia cattle hair for the adulteration of wool is becoming a recognized business. It is claimed that these hairs are excellent substitutes for wool, and not only cheaper, but fully as durable.

We have records of its use at different eras in the world's industrial record, but as frequently as it has been employed so frequently has it been relegated again to the qualification of mattress and sofa stuffings. For some years, however, it has been employed by many carpet manufacturers to be worked into the yarns.

It is gathered in large quantities, and brought to this market for use in carpets at the rate of fully twenty million pounds per year. How much is made up in other fabrics we are unable to state. The hair is invariably taken from the hide at the tanner's, by means of a process termed "sweating," and is not clipped, as is the popular supposition. The hides are soaked in vats for from three to five days. They are then stretched on beams or stands, with arched surfaces, thus, ⌒, and then rubbed with a *sciver*, or scraper. The hair is easily susceptible to this proceeding, and peels off. It is next washed and baled. The hair is brought mostly from the West, though considerable "cattle hair" (called Russian cattle hair) comes from Europe. About four million pounds are imported to New York and Philadelphia annually, and used in the manufacture of blankets, cloakings, and carpets.

Buffalo hair is also used, though there is not so much coming into the market now as formerly, owing to the law having prohibited the slaughter of the animal for fear of the utter extermination of its breed. Two million pounds will cover the amount worked into carpets per annum. And again we find camel's hair used. We conversed with one dealer recently who assured us that he had sold over four hundred thousand pounds of the stuff during the past four months. This, like all such matter, is incorporated with other material—wool, shoddy, etc.—before spun into yarn.

Of the various hairs incorporated with wool textures, cow hair is the most common. When received in its rough state from the West, in bales, it is, *first*, washed; *second*, put through a picker, which eradicates all impurities; *third*, it is spread on an "apron," in quantities according to the intentions of the manufacturer, and the proportions of wool and shoddy are likewise selected and mixed with the hair; *fourth*, from the apron, the hair, shoddy, and wool are worked off (by a tender—usually a young girl—who mixes the selections) on to a carding machine, which mixes the properties evenly. It is then spun. The same process is applicable to all other kinds of hair.

The red cow hair is sold for about two and one-half to three and one-half cents per pound, and refuse light colorings; the *white* brings from eight to twelve cents per pound.

The Russia cattle hair costs more, the prices for which are: Russia cattle hair (red), four cents; Russia cattle hair (white), twelve cents. This hair, which was sent here at one time in no inconsiderable quantities, is now imported more cautiously. Much of the material was formerly lost in the refuse of the waste troughs and imperfected preparatory machines. Now, however, considerable economy is exercised in saving the wash and utilizing it. The prices brought to day, in the New York markets, for these "mixings" for *woolen* yarns, are as follows:

Cow hair (red), 2½ to 3½ cts.; cow hair (white), 8 to 12 cts.; buffalo hair, 8 to 12 cts.; camel's hair (Russian), 16 to 20 cts.; camel's hair (China), 22 to 28 cts.; camel's hair (noils), 40 cts.; Russia cattle hair (red), 4 cts.; Russia cattle hair (white), 12 cts.—*Carpet Trade Review.*

Tincture of Insect Powder.

A concentrated tincture of insect powder is highly recommended as an insecticide by Finzelberg, who prepares it by digesting one part of Persian insect powder in ten parts absolute alcohol, and claims that in order to prove efficacious it should be scattered by means of an ordinary perfumery atomizer. When thus used in closed rooms all flies soon drop dead; while scattering it over linen, etc., acts as a protection agains fleas, etc.

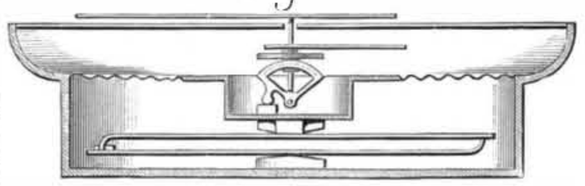
Azotine.

The *Annales Industrielles* notes a new discovery by M. Heddebault, which consists in the separation of wool from cotton in rags and waste products in which these two textiles are mixed, by treating them with steam at 150° C. under a pressure of five atmospheres. Under the influence of this temperature the wool is decomposed, fuses, and flows off into a lower receptacle, while the cotton, flax, and in fact all vegetable fiber, are unattacked. It is then only necessary to pound and wash the latter to obtain products containing no longer any traces of wool, and which are admirably adapted for bleaching and manufacturing into paper. The solution of wool, evaporated to dryness, has been named by the inventor *azotine*. Owing to the increase in value of mixed cotton and woolen rags thus treated, especially for paper making, the cost of the operation is virtually covered, and the new product—*azotine*—costs really nothing. This material, which is completely soluble in water, and which contains all its nitrogen in a soluble form, is to be used, mixed with dried blood, as a fertilizer. The invention is said to be an important one, both for the paper making industry and for agriculture.

THE FIRST INVENTOR OF THE STEAM GAUGE.

Mr. Sydney Smith, of Nottingham, England, who claims to be the "original inventor and first patentee of the steam pressure gauge," not long since sent a letter to the *Engineer* setting forth his claim, and giving a copy of a corroborative letter from George Stephenson. The following is the letter, together with a note appended by the editor of the *Engineer*:

Fig. 2



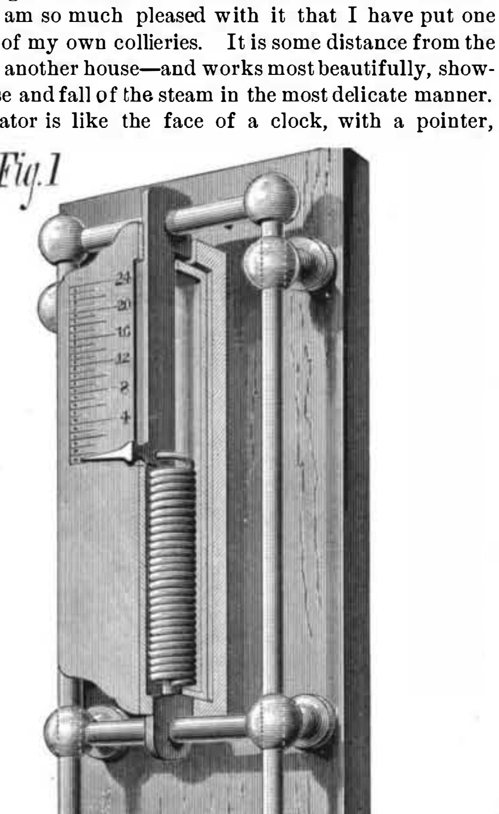
MOREAU'S STEAM GAUGE.

"Tapton House,
"Chesterfield, October 15th, 1847.

"A most important invention has been submitted to me for my approval, patented by a Mr. Smith, of Nottingham, and intended to indicate the strength of steam in steam engine boilers. It is particularly adapted for steamboats, and can be placed in the cabin, on deck, or any other part of the vessel, where it may be seen by every passenger on board. It may also be fixed in the office of every manufactory where a steam engine is used at a considerable distance from the boiler. I am so much pleased with it that I have put one up at one of my own collieries. It is some distance from the boiler—in another house—and works most beautifully, showing the rise and fall of the steam in the most delicate manner. The indicator is like the face of a clock, with a pointer, making one revolution in measuring from 1 lb. to 100 lb. upon the square inch of the pressure of steam. It is quite from under the control of the engineer, or any other person, so that its indications may be relied upon, and the construction is so simple that it is scarcely possible for it to get out of order. I might give a full explanation of the machine, but I think it best to leave that to the inventor himself. The numerous and appalling accidents which have occurred from the bursting of steamboat boilers have induced me to give you these observations, which I think desirable to be laid before the public. I may state that I have no pecuniary interest in the scheme, but being the first person to whom it has been shown, and the first person to make use of it, I feel it a duty I owe to the inventor, as well as the public, to make it as universally known as possible. The indicator is put up at Tapton Colliery, near Chesterfield, and may be seen any day by any respectable person.

(Signed) "GEORGE STEPHENSON."

Fig. 1



BRADLEY'S STEAM GAUGE.

"[We have taken some trouble to investigate Mr. Smith's claim to be considered the first inventor of a practical steam gauge, and we have every reason to believe that he is entitled to that honor. In other words, Mr. Sydney Smith, of Nottingham, patented, in 1847, the first steam gauge which was efficient, compact, portable, and suitable for use on boilers carrying a high pressure of steam. We have failed to find any record of an invention fulfilling the same objects of older date than Smith's patent.—ED. *E.*]"

We have been more fortunate than the editor of the *Engineer* in our search for the anticipator of this invention, in finding that two patents were granted in this country for practical steam gauges prior to 1847.

The first was granted to George Bradley, of Paterson, N. J., August 16, 1841. The second to De Fontaine Moreau, of London, England, August 20, 1846.

The construction of Bradley's steam gauge is so clearly shown in Fig. 1 as scarcely to require description. It consists of a cylinder connected with the boiler and containing a piston which is acted on by steam pressure, and connected with a rectangular sliding frame whose upward movement is opposed by a spiral spring. The sliding frame carries a pointer which moves over a fixed scale. Of this steam gauge the inventor, in his patent specification, says:

"The operation of the machine is thus: The steam pressing against the piston forces it outwards or towards the spring, and with it the rectangular frame, the cross-head of which, being connected with the fixed bar, causes the spring to which it is attached to become elongated, and the index which it carries to move opposite to that part of the scale which indicates the pressure against the piston. When the ordinary spring balance is used, if the area of the piston is one inch, the index will point on the scale to the number of pounds per square inch of pressure in the boiler above that of the atmosphere: the scale, however, admits of any mode of graduation.

"This machine is expected to become a necessary appendage to every steam boiler, for the purpose of enabling any one, however ignorant, to tell at any time by sight the pressure of steam in the boiler as well as the most experienced engineer.

"It is believed that there is now no instrument in use for this purpose. The ordinary spring balance which is usually attached to locomotive engines is connected to the lever of a safety valve, and merely indicates the pressure of the steam at the instant it is capable of lifting the valve and at no other time, and even then it requires a nice calculation to ascertain the pressure on the boiler, as it depends on the leverage of the safety bar, so that to an ordinary traveler it affords no information of the pressure of the steam by looking at it however minutely, while by the one now proposed, literally, 'he who runs may read,' and when we reflect on the number of lives that have been lost on board steamboats which such an instrument might have been the means of preventing, its value as a life-preserver will be apparent to all."

In Moreau's steam gauge, shown in the smaller engraving, the steam pressure acts on a diaphragm, whose motion is multiplied by a toothed quadrant and a pinion on the index arbor.

Nevada's Natural Phenomena.

Nevada is a land of curious natural phenomena. Her rivers have no visible outlet to the ocean. She has no lakes of any magnitude. She has vast stretches of alkali deserts, however, that give every indication of having been the beds or bottoms of either seas or lakes. Down in Lincoln county there is a spring of ice-cold water that bubbles up over a rock and disappears on the other side, and no one has been able to find where the water goes. At another point in the same county is a large spring, about twenty feet square, that is apparently only some eighteen or twenty inches in depth, with a sandy bottom. The sand can be plainly seen, but on looking closer it is perceived that this sand is in a perpetual state of unrest. No bottom has ever been found to this spring. It is said that a teamster, on reaching this spring one day, deceived by its apparent shallowness, concluded to soak one of his wagon wheels to cure the looseness of its tire. He therefore took it off and rolled it into the, as he thought, shallow water. He never laid his eyes on that wagon wheel again. Our mountains are full of caves and caverns, many of which have been explored to a great distance. Speaking of caves, a redeo was held last spring over in Huntington valley. During its progress quite a number of cattle were missed and for a time unavailing search was made for them. At last they were traced to the mouth of a natural tunnel or cave in the mountain. The herders entered the cave, and following it for a long distance, at last found the cattle. It appears that they had probably entered the cave, which was very narrow, in search of water. It had finally narrowed so that they could proceed no further. Neither could they turn around to get out. They had been missed some days, and if they had not been found must inevitably have perished in a short time. As it was they were extracted from their predicament with difficulty, by the herders squeezing past and getting in front of them and scaring them into a retrograde movement by flapping their hats into the faces of the stupid bovines.—*Eureka Leader.*

Another New Atlantic Cable.

When the excitement in this country and Europe which attended the laying of the first Atlantic cable, and the doubt, delays, and misfortunes of that great enterprise, are contrasted with similar operations at the present time, we are enabled to realize the progress which has been made in telegraphy within less than a quarter of a century. The Anglo-American Telegraph Company has just completed the work of laying a new cable from Valentia to Heart's Content, and so much a matter of course has it become, and so certain and comparatively easy an operation, that it attracts scarcely any public attention. The newspapers record the fact in a news paragraph of a dozen lines, and scarcely an allusion is made to it in editorial columns.

These slender cords buried in the depth of the sea now connect every country of the earth, and the history of the preceding day at the Antipodes appears in the morning papers as regularly as the incidents occurring in the immediate vicinity of their publication. The electric telegraph has bound together the most widely separated sections of the earth, and has revolutionized the business and social systems of the world.

The Atlantic cable telegraph business has developed so enormously and is so rapidly and constantly increasing as to continually demand additional facilities, and these the Anglo-American Company promptly furnish. A few years ago one cable more than sufficed for all the business offered. The business was then an experiment, and the necessarily high rates charged for the service restricted the patronage to very limited proportions. From time to time, as experience enabled it to be done with safety, these charges have been reduced until, at the present time, messages are transmitted between this country and Europe at rates which would have speedily ruined any company a few years ago. It is true that the charges for cable telegraph service across the Atlantic are at present abnormally low (12½ cents per word) in consequence of bitter competition of rival companies, but even without such competition the service will hereafter be profitably performed at a cost to the public which, not many years since, would have been regarded as absurd and ridiculous to propose. This is made possible by improvements in the construction and operation of the cables. By duplexing the cables their capacity for the transmission of business has been practically doubled, and it is not regarded as impossible that their capacity may yet be still further largely developed.

The Anglo-American Company has now in operation four cables, and the Direct United States one, which by the successful application of the duplex system in working them afford facilities equal to what would have been realized with ten worked in the ordinary way. It is expected that these will adequately meet the demands of the public for some time to come. Should more be required, however, the managers of the Anglo-American and Direct Companies are prepared to supply them promptly, each company having wisely accumulated a large reserve fund for maintenance of existing cables, and providing new ones as required.

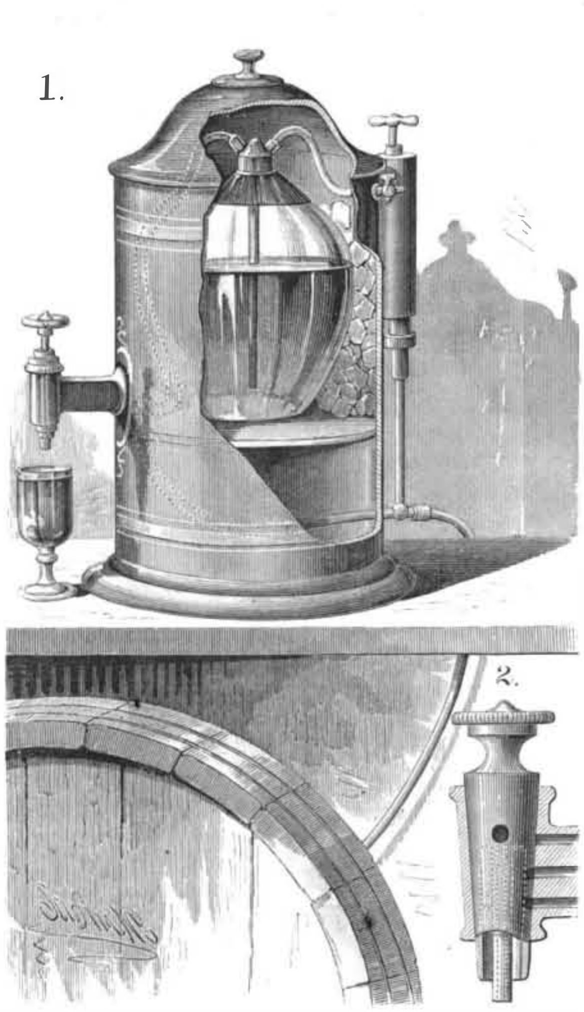
The efforts of the cable companies are liberally seconded by the Western Union Company, which is now engaged in building an entirely new line of the largest wire used for telegraphic purposes, which is to be quadruplexed and used exclusively for cable business.—*Journal of the Telegraph.*

A Chemical Lung.

On Wednesday, August 18, Dr. Richard Neale, in the presence of a number of engineers, including the manager of the underground railway, and other scientific men, gave an interesting and, as far as it went, successful demonstration of a scheme to purify the foul air of tunnels, mines, cabins, churches, theaters, hospitals, and other buildings. The proposal is, we believe, a novel one, and promises to create a new era in ventilation. Nearly all attempts hitherto made to purify the air in crowded buildings have been mechanical, and have consisted of driving out the foul air by currents of fresh air. Dr. Neale's proposal, on the other hand, is a chemical one, and is designed to destroy the poisonous gases. It is not, of course, intended to supersede ordinary ventilation by currents, but rather to act as an auxiliary. The essence of the scheme is the adoption of some simple chemical facts. As the lungs of living beings appropriate oxygen and give off carbonic acid gas, Dr. Neale proposes to make a "chemical lung" which will appropriate carbonic acid and sulphurous gases from the air containing them, without yielding any products in exchange. The air in the tunnels of the underground railway was referred to as a conspicuous and well known example of impurity irremediable by mechanical means. The principal deleterious gases in this instance are carbonic acid and sulphurous gases and carbonic oxide. All these, but especially the two former, may, Dr. Neale maintains, be easily got rid of by chemical means. By mixing a solution of sulphurous acid and water in a flask Dr. Neale made an excellent imitation of the air at the Baker street or Portland road station. He then added a small quantity of solution of caustic soda, and agitated the flask briskly for a few seconds, and immediately the sulphurous smell was abolished. Into the same flask a current of carbonic acid gas was next passed, so that a lighted taper introduced into the flask was at once extinguished. After a few shakings a lighted taper was again introduced and burnt with a bright, steady flame, showing that the soda had taken up the acid. Similar experiments were made with solutions of caustic lime. Dr. Neale said the facts illustrated in these simple experiments formed the basis of his scheme for purifying ordinarily impure air. As regards the Metropolitan and other underground railways, the locomotive engines might, he said, be supplied with a tank containing a strong solution of caustic soda or lime, through which the smoke should be made to pass before being discharged into the outer air. By this means the carbonic acid gas and the sulphur would be eliminated. The carbonic oxide would require to be dealt with in another way, which need not now be explained. In order to attain further purification of the air in the tunnel, each train might be furnished with a truck open at both ends, and appropriately fitted with trays or other contrivances for holding solutions of lime or soda. As the train progressed air would rush through the tanks or trays, and be robbed of its carbonic acid and sulphur in its course. The proposal is as happy as it is ingenious. It further commends itself on the grounds of simplicity and cheapness. It only remains for those concerned, and we would especially indicate the directors of the underground railway and the managers of theaters, to manifest a proper public spirit, and fairly test its practicability. There should be no insuperable difficulty in putting it to a practical test. Meanwhile, we shall watch with interest any attempts that may be made to carry out the idea in detail.—*London Lancet.*

NEW BEER FAUCET.

Beer making and selling have attained an importance both in extent and pecuniary interest all over the world that ranks it among the greatest industries of the age. Malt



NEW BEER FAUCET.

liquors constitute the beverage of the multitude, and it is essential that these liquors be dealt out in a sweet and wholesome condition. All kinds of malt liquors that are beginning to sour, or have become sharp pricked or stale, are unwholesome, since these terms express the several stages through which all malt liquors pass by exposure to the atmosphere, from a palatable article to that of an offensive and dangerous one; hence various and often expensive devices have been resorted to, both to force beer from a cask without permitting its gas to escape, and to bring it from below up to a counter, none of which have hitherto answered a satisfactory purpose.

The improved beer faucet shown in the engraving is secured by three United States patents, and is patented in England, France, and Germany. Beer and other malt liquors, to be wholesome and properly preserved, must either contain or be capable of generating an amount of gas sufficient to empty the cask by its expansive force. Proceeding upon this proposition, which was found by numerous trials to be correct, it seemed manifest that to preserve such liquor from becoming stale and unwholesome it was only necessary to prevent the air from entering the cask and the gas from escaping from it, and apparatus, by which a glass of beer can be readily drawn from a fresh keg without waiting for the excess of froth to subside, is desirable.

The patentees of the faucet illustrated claim that they have succeeded in making such an apparatus, which, if adopted, would afford a great pecuniary benefit to the brewer in saving great numbers of long brass faucets, short and less expensive ones being as good, and largely avoiding the liability of empty beer kegs becoming sour and musty by exposure to the air before they are refilled; and it will secure to the retailer a great saving of time, and also the labor attendant upon the insertion and removal of vent valves, to say nothing of the great waste from the beer becoming stale.

This device may be either cheap or ornamental, and it is capable of preventing beer from becoming stale at any age, and it will bring beer that is fit to drink from the cellar without the use of a pump. It will also cool it without extra expense, since the ice that is used to cool drinking water also cools the beer. It can be readily applied to any faucet in a cask by means of a hose and coupling.

The engraving shows a sealed beer receptacle placed in the ice chamber of an ordinary water cooler. The faucet of the cooler, however, performs three separate functions: it will draw ice water from the cooler, it will take beer directly from the cask, or from the glass receptacle, as may be desired. The internal construction of the faucet is shown in Fig. 2. A model of this apparatus is on exhibition at the Inventors' Institute, No. 733 Broadway, New York.

Further information may be obtained by addressing Dr. A. J. Spencer, No. 115 W. 126th street, New York, or the Inventors' Institute as above.

THE AMERICAN SCIENCE ASSOCIATION.

The proceedings of the first two days of the Boston meeting of the American Association for the Advancement of Science were noticed last week. The early promise of a large and, in the fullest sense of the word, popular meeting was amply fulfilled. Nearly a thousand members were registered; 595 new members and 45 fellows were elected, among them Mrs. E. A. Smith, of Jersey City, the first lady thus honored. The number of papers entered was 280. A very active interest was manifested in the proceedings throughout, and the hospitality of the people of Boston and the surrounding towns was unbounded. Boston and its vicinity are rich in institutions, manufactories, pleasure resorts, and points of historic interest, and not a few of the members found these sources of pleasure and profit unsurpassed even by the regular proceedings of the association.

Comparatively few papers were read before the general sessions, the attendance being so large and the number of papers so great that most of the work was done in the sections and subsections. In view of the increasing size of the annual gatherings the committee on membership reported in favor of extending the scope of the association, recommending that instead of two sections with subsections, as at present, the association should have eight, as follows:

A—Physics. B—Astronomy and Pure Mathematics. C—Chemistry, including its applications to agriculture and the arts. D—Mechanical Science. E—Geology and Geography. F—Biology. G—Anthropology. H—Economic Science and Statistics. It was also recommended that there may be a permanent subsection of microscopy, which shall elect its own officers, and be responsible directly to the Standing Committee, and that the Sectional Committee of any section may, at its pleasure, form one or more temporary subsections, and may designate the officer thereof. The report will be acted upon at the next meeting.

Among the other reports of special committees two were of general interest. The report of the Committee on Science-teaching in the Public Schools has been noticed elsewhere. The committee to memorialize Congress and State legislatures regarding the cultivation of timber and the preservation of forests recommended a law to protect trees planted along highways, and to encourage such planting by deductions from highway taxes; also the passage of a law that shall exempt from taxation the increased value of land arising from the planting of trees where none were growing to such period as may appear proper, or until some profit may be realized from plantations; by appropriations of money to agricultural and horticultural societies, to be applied as premiums for tree-planting, and for prizes for the best essays and reports upon subjects of practical forest culture; by encouraging educational institutions to introduce courses of instruction having reference to practical sylviculture; by laws tending to prevent forest fires; by imposing penalties against willful or careless setting of such fires, and enlarging and defining the powers of local officers in calling for assistance and in adopting measures for suppressing them; by establishing under favorable circumstances model plantations; by the appointment of a Commission of Forestry under State authority analogous to the Commission of Fisheries.

The cable message to the British Association, previously referred to, received a cordial answer returning thanks therefor. A message of congratulation was also sent to the venerable M. de Chevreul, senior member of the French Academy, on his 95th birthday.

The officers elected for the next meeting, in Cincinnati, to begin August 17, 1881, are: President, Professor G. J. Brush, of New Haven; Secretary, Professor C. V. Riley, of Washington; Treasurer, Professor W. S. Vaux, of Philadelphia; President of Section A, Professor A. M. Mayer, of Hoboken; Secretary, Professor John Trowbridge, of Cambridge; Vice-President of Section B, Dr. George Englemann, of St. Louis; Secretary, Professor William Saunders, of Canada; Auditing Committee, Professor Henry Wheatland, of Salem, and Professor Thomas Meehan, of Philadelphia.

In the permanent subsection of Chemistry, Professor William Ripley Nichols, of Boston, was elected Vice-President, and Professor H. W. Wiley, of Lafayette, Ind., Secretary. In the permanent subsection of Anthropology, Colonel Derrick Mallory, of Washington, was elected Vice-President,