POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The regular weekly meeting of the Association was held in their room at the Cooper Institute on Thursday evening, June 19th, Dr. Stevens in the chair.

PREMIUMS OF THE AMERICAN INSTITUTE FOR 1862.

Mr. FISHER, Secretary *pro tem.*, read a communication from the Board of Managers of the American Institute, stating that they had delegated the award of premiums to be given by the Institute this year to the Polytechnic Association and the Farmers' Club. A list of the premiums, and the subjects for which they were offered, was embraced in the communication, and a request was expressed that a report of the awards should be ready by the 31st of December.

Mr. DIBBEN—I see Mr. Johnson here, who is a member of the Board of Managers, and I would like to ask what steps are to be taken to inform those who would be likely to compete for them, in regard to the subjects for which premiums are offered by the Institute?

Mr. JOHNSON—The Managers will furnish the Association with circulars for distribution.

Mr. DIBBEN—This was the course that was adopted last year, and as I served on one of the committees for examining articles submitted for competition, I know how the plan worked. It was a complete failure. Since the premiums were awarded, I have met half a dozen persons who had valuable and interesting inventions that they would have liked to submit for competition, if they had known that the Institute was about to bestow premiums. If the offers had been published in the popular scientific papers, like the SCIENTIFIC AMERICAN, they would have come to the knowledge of almost everybody in the country who would care to submit their articles for examination, and we should have had a much fuller competition, and our premiums would have been more satisfactorily bestowed.

I move, Mr. Chairman, that a committee of three be appointed by this Association, to confer with the Board of Managers of the Institute, in regard to advertising the offers of premiums.

Prof. SEELY—Mr. Chairman, I second the motion, and I indorse all that Mr. Dibben has said. I also was familiar with the operations last year, and I know that the plan of sending circulars is entirely inefficient. If every member of this Association should send a number of circulars, at an expense of two or three dollars to himself, not one in a thousand of those who would like to compete for these premiums would be reached, but an advertisement in the SCIENTIFIC AMERICAN would reach 15,000 readers, or perhaps 30,000.

Mr. DIBBEN.—One hundred thousand.

Prof. SEELY—One hundred thousand readers, including all the professional inventors in the country; while a short advertisement in *Silliman's Journal*, would reach all those who would be likely to write essays.

Mr. STEVENS—I have been all through the States of Vermont, Maine, New Hampshire and Connecticut, and I found in every machine shop a copy of the SCIENTIFIC AMERICAN hanging up in one corner. If you want to get at the makers of machinery there is no doubt about the proper course—you must publish your notice in the SCIENTIFIC AMERICAN.

Mr. JOHNSON—The Board of Managers have considered this subject, and I have no doubt that they will agree with this Association in regard to the proper mode of giving publicity to our offers of premiums.

The Chairman appointed Messrs. Dibben, Seely and Babcock, a committee to confer with the Board of Managers of the Institute, and the Association proceeded to the discussion of the regular subject of the evening,

SUPERHEATED STEAM.

This subject was discussed at the last meeting before this, but on that occasion most of the evening was devoted to descriptions of the different kinds of apparatus employed, illustrated by drawings on the blackboard, and, as engravings would be required to make the descriptions intelligible, the discussion was not reported. It is to be presumed that all of the plans of any value have been illustrated and fully described in our pages.

Mr. BABCOCK—Mr. Dibben requested me to describe a superheater which has been in use in Mystic, Conn., for the last six years, giving perfect satisfaction, requiring no repairs and saving 25 per cent of the fuel. (The speaker proceeded to make a drawing on the blackboard, and describe the apparatus of Stillman & Wilcox. The heat employed is taken directly from the fire box, not being the waste heat, as usual, and a self-operating valve regulates the amount of superheating.

Prof. SEELY—The heat used in superheating is commonly waste heat, or the heat going up the flues, in the products of combustion. Such heat makes no extra cost, and all that gets into the steam, shows itself in mechanical force. The heat, however, which gets into the water in the boiler, is not all available in work; until the water reaches the boiling point, the expansion, although of great force, is of such narrow limits, that we do not use it. To raise water from 0° to 212°, 20 per cent as much heat is required, as to raise it then into steam; and this 20 per cent gives no motion to the engine.

But the value of superheating is more plainly shown, in another direction, and by using figures. In order to be easily understood I use only round numbers, but numbers which are very near the exact truth:—1 lb. of water at 212° is converted into 1,700 volumes of steam, by 1,000 units of heat. The 1,700 volumes may be taken as the measure of the available mechanical force; the 1,000 units of heat are worth 1,700. Now, if these 1,700 volumes of steam at 212°, be raised 500° higher, or to 712°, the bulk will be doubled; for the heat put into the steam we have another 1,700 volumes; or, in other words, the heat used upon the steam has given us the same value as the heat used upon the water. How much heat is there required to raise 1 lb. of steam 500°? The specific heat of water is 1, and the specific heat of steam 5, or a unit of heat will raise 1 lb. of water 1°, and 1 lb. of steam 2°. But in our case, suppose the steam was raised 500°, and now it is evident at a cost of 250 units of heat. 250 units of heat used in superheating steam has done the work of 1,000 units used upon water; heat goes four times farther on steam than on water.

If waste heat is used for superheating the steam to 712°, we double our power without increased cost for fuel; or, if the heat costs at the same rate as when used in water, we double power at an additional outlay of 25 per cent. In the first case we realize a total gain of 50 percent, and in the second of 37½ per cent. But, unfortunately, it is not yet practicable to use steam at a temperature so high as 712°—the materials we use about our engines will not endure it, we can, however, practically use steam at about 400°, and thus realize an economy as high as 25 per cent.

Superheated steam is now much used in chemical operations, as a convenient means of heating and to effect certain decompositions. Superheated steam upon iron, at a red heat, gives its oxygen to the iron and its hydrogen escapes; upon carbon, at a white heat, its oxygen unites with the carbon to form carbonic oxide and carbonic acid, and the hydrogen is set free; upon metallic sulphides, the hydrogen unites with the sulphur to form sulphide of hydrogen, and the oxygen with the metal; upon oils, when the fat acid is seperated from the glycerine, &c. &c.

Mr. ROWELL—I hold in my hand a table of the observations made at one of the series of experiments which were tried at the Metropolitan Mills in this city, in 1860, to test the value of superheating steam and of working steam expansively. These experiments were made under the direction of B. F. Isherwood, now Engineer-in-Chief of the U. S. Navy, at a cost of about $5,000, which was paid by Mr. George Hecker. They were commenced on the 1st of February, and finished on the 1st of November. An engine was constructed expressly for the purpose, and it was the first time in the history of the steam engine, in which an engine was made for the single purpose of testing questions in regard to its operation. The fuel and water of condensation were carefully weighed, and the temperature and pressure of the steam in all parts of the apparatus, as well as the temperature of the room, the barometric pressure, the temperature of the feed water, and, in short, all circumstances that could affect the result were carefully observed and recorded every hour. It was the most valuable, as well as the most costly, series of experiments that have ever been made in regard to the practical working of steam,

The plan of superheating was to surround the cylinder with a steam jacket, and then throttle the steam in the cylinder, so as to reduce its pressure without diminishing its temperature. It was found that there was no marked economy in superheating more than 5°. At this extent of superheating, the economy was 54 per cent; that is to say, 46 pounds of coal, with this method of superheating, did as much work as 100 pounds of coal, with steam used in the ordinary way.

Mr. DIBBEN—I introduced this question with an idea that the facts brought out would show that the prejudice against superheated steam is not well founded, and the discussion has fully sustained my opinion. The statement of Mr. Babcock shows that if a superheater is properly constructed, there is no burning out of the tubes, about which we have heard so much, and the working of Ericsson's air engines, proves conclusively that lubricating materials will bear a temperature of 450° without being decomposed.

On motion of Mr. Dibben it was voted that the meetings of the Society, during the summer, should be held monthly, on the second Thursday of each month, and the Society adjourned to the second Thursday in July.

The British Patent Laws.

The following sensible remarks are from the London *Engineer*:—"We are to have a commission to inquire into the working of the law of patents. Ever since patents for inventions were first granted, their operation has been, in many respects, unsatisfactory. That the balance of advantage has always been greatly in their favor has been generally believed, and there are abundant reasons for the conviction that anything like the abolition of patents would be attended with great national loss. Nothing of that kind, however, is at all likely at present, and the commission to be appointed by the Queen will have only to consider wherein patents may now be granted undeservedly, and how the inequalities and inconveniences attending the system may be reduced to a minimum. In bringing forward his motion for an address to the Queen, Sir Hugh Cairns expressed himself in terms much the same as those which we long ago adopted in treating of the whole subject of patents. He clearly distinguishes that, while no inventor has an inherent right to a patent, he has an unquestionable right to conceal anything he may have invented unless the public make terms with him for its disclosure. That, without some encouragement to divulge their plans, inventors would generally prefer to keep them secret is not only evident enough of itself, but even some of those, including the *Times*, who have lately attacked patents altogether, have formerly given great prominence to this consideration. More than ten years ago, and before the passage of the Patent Law Amendment Act of 1852, the *Times* wrote as follows":—

> The law, however, regards those who wish to derive a pecuniary benefit from the result of their labor, inquiry, and ingenuity; and we ask what such men would do, supposing no law existed by which they could secure a property in that which they had discovered? The answer is obvious; they would endeavor to keep their process a secret, and in those cases in which secrecy is impossible, they would have no motive to go through the trouble and expense of discovery. Where secrecy might be possible, we should find the new process fenced round by every mystery and mystification which the ingenuity of the discoverer could devise. Secrecy would be enforced on workmen, as far as possible, by keeping them in ignorance; and when this became no longer feasible, the sanction of oaths would be employed to that end. A state of most painful suspicion and restraint would be the condition of every one who was in possession of an invention, and of all whom he employed. A more mischievous, as well as a more disagreeable condition, can hardly be conceived.

The London *Times* is not the liberal paper that it was a few years ago, before it became the property of Rothschilds. Once it was the voice of the English people and advocated their interests, now it is the organ of the bankers and the great capitalists, hence its wheel about on the patent laws, and its opposition to mechanics and inventors, and also the Northern States of America which represent the honored industry of the Republic.

A CORRESPONDENT writing to us from Canada West, states that on the night of the 16th June a severe frost visited nearly all that Province and cut down the corn, melons, beans, &c.

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Improved Iron-Hub Carriage Wheel.

The annexed engravings illustrate a wheel hub invented by C. Leavitt, of Cleveland, Ohio, which the inventor claims to be rather superior to any heretofore introduced to the public. Its construction is novel and will be readily understood by examining the cuts, of which Fig. 1, is a perspective view, Fig. 2, a longitudinal, and Fig. 3, a cross section Fig. 1. represents a portion of the spokes cut off even with the surface of the hub in order to show their relative positions.

The hub is formed in two sections, *a* and *b*, which fit upon the pipe box, *c*, and are held in place by a shoulder and the nut, *d*. In the two sections, *a* and *b*, are formed radial mortises to receive the spokes as shown in Fig. 3; the mortises in the section, *a*, to receive one half of the spokes, *e e e*, and the mortises in the section, *b*, to receive the other half of the spokes, *f f f*. It will be seen that the tenon portion of each spoke has half of its width in the iron mortise, while the other half is between two of the spokes in the opposite section of the hub, thus each spoke is held partly by wood and partly by iron. The tenons of the spokes taper only one way, two of the sides being parallel, and the other two converging toward the end.

In forming the wheel, the pipe box is taken from out the hub, and the spokes are driven into the mortises as hard as they will bear, when their inner ends are reamed off even with the interior surface of the sections, *a* and *b*, so that when the pipe is introduced the inner ends of the spokes rest against its external surface.

The sections, *a* and *b*, are drawn firmly against the spokes by screwing the nut, *d*, upon the end of the pipe box, and if the spokes are at any time loosened by shrinking, they may be readily tightened by screwing this nut farther upon the pipe box.

If a spoke is broken it may be readily replaced by taking off the nut, *d*, without disturbing the other parts of the wheel.

The wheel is held upon the axle by the nut, *g*, which is covered by a cap, *h*, to confine the grease within the hub.

The inventor claims that though this hub is more expensive than a wooden one, the whole wheel made with this hub is as cheap as a wheel with a wooden hub; owing to the great economy of labor in forming the spokes and putting the parts together. The other advantages claimed are the facility with which the wheel can be taken apart to replace a spoke or any other part that may become worn or injured, especially for the renewal of the pipe box which is so difficult in wooden hubs; the ease with which the wheel can be oiled without taking it from the axle; its neat and ornamental appearance; but especially its great strength and durability.

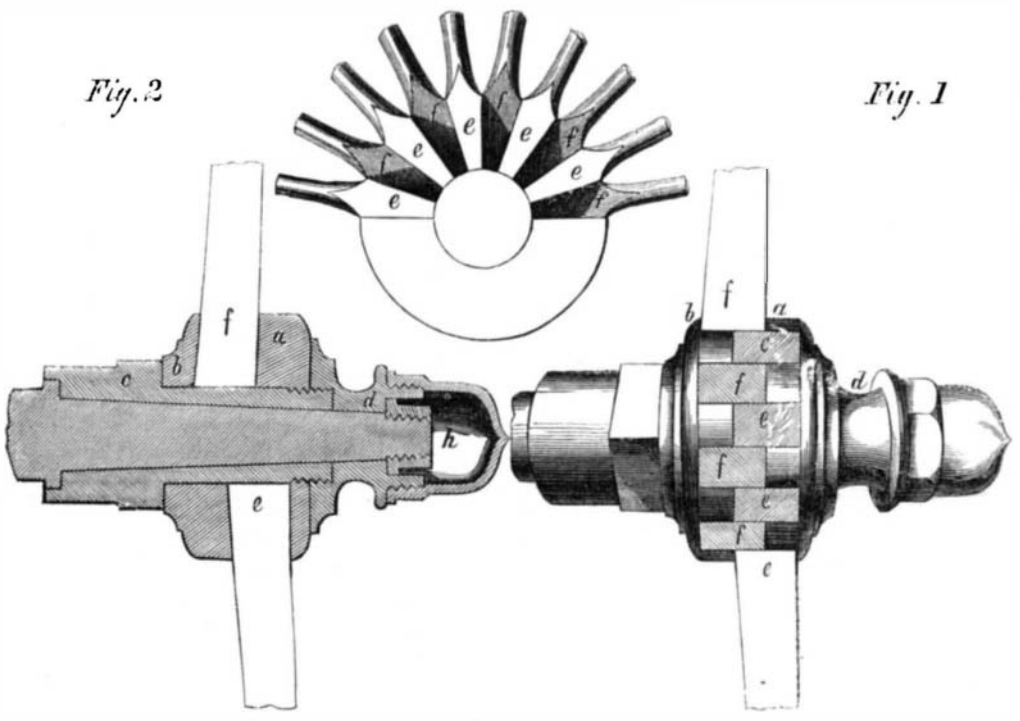
We commend this wheel to carriage makers, and to our army officers and army wagon contractors as well worthy of thorough examination and trial.

The patent for this invention was granted January 14, 1862, and further information in relation to it may be obtained by addressing the inventor, at Cleveland, Ohio.

Fig. 3

Fig. 2

Fig. 1



LEAVITT'S IRON-HUB CARRIAGE WHEEL.

Parlor Pastime—The Lampascope.

Many of our young friends will be pleased to hear something of this simple invention, so capable of affording them amusement. It consists in the application of the principle of the magic lantern and the dissolving view to an ordinary table lamp. To construct a lampascope (presuming the possession of a lamp), the ordinary globe must be removed, and in its place a cardboard box, square, round, or octagonal, as is most convenient to make, must be substituted, and into one side of this two tubes of cardboard must be inserted, after the manner of an ordinary magic lantern. Into these tubes, which slide one within the other, lenses are to be fixed, say the lens nearest to the light shall be of two inches focus, and the one in the inner tube or outer lens of three inches focus. According to the relative power of the lenses, so will be the size of the picture on the wall; thus the lenses may be of various focuses, and not exactly, unless convenient, to the measure we take as the example; which, however, will be well understood by those whose knowledge of the laws of optics may induce them to make this lampascope for the entertainment of their friends. Between the lenses and the light a place must be made for the purpose of inserting the slides of figures to be represented on the wall upon which the disk of light is thrown. These figures may be painted on glass slides by the amateur himself, or purchased ready for use. Some very beautiful views, portraits, &c., may now be had on glass, applicable to this purpose, produced by the collodion and photographic process, and at a price suitable to most pockets. Having thus far constructed the instrument, we have only to hang up a sheet against the wall to make it white, and having put our lampascope on the lamp, a round disk from the lenses will be shown on the sheet. The tubes must be regulated like a telescope to make the picture distinct; and according to the character of these so will the exhibition be, "grave or gay, lively or severe."

Musical Sounds Produced by Electricity.—Mr. George Gore has devised the following beautiful experiment:—A pool of mercury, from one to three inches diameter, is formed in a circular vessel of glass or gutta percha; this is surrounded by a ring of mercury about one-eighth to one-tenth of an inch wide, and both are covered to the depth of about half an inch with rather a strong solution of cyanide of potassium. The pool of mercury is then connected by a platinum wire with the positive pole of a powerful voltaic battery and the ring of mercury is connected with the negative pole. A continuous harmonious sound is then produced.

Large new copper smelting works are about to be erected at Ontonagon, Lake Superior. The main building is to be 100 feet long by 60 in width. The roof is to be of sheet iron similar to that of Park, McCurdy & Co.'s smelting works in Pittsburgh, Pa.

Great quantities of ivory are obtained from elephants that are found imbedded in the ice fields of Siberia, destroyed and preserved thus by some manner only to be conjectured.

A Powerful Hydraulic.

In California a hydraulic is a high head of water conveyed through a pipe and applied to wash down the face of gravelly hills and banks containing the auriferous deposits. Thus applied, water exerts a tremendous force in leveling hills and exhuming the golden nuggets. At Brandy City, in Northern Sierra, are rich and extensive diggings, which have been hard to work on account of cement and hard gravel; but they have several powerful hydraulics now at work there, one of which has a fall of 240 feet through 15-inch iron pipe. This is said to be the most powerful in the State, and will lift boulders or detachments of cement of a tun weight when brought to bear beneath them.

Preservation of Grain in Air-tight Bins.

We find in *Le Génie Industriel* a notice of a report recently made to the Society of Civil Engineers in Paris, by M. Doyère, giving an account of a long series of investigations and experiments made by him in relation to the preservation of grain. M. Doyère comes to the conclusion that the very best mode of preserving wheat and other grains is by inclosing them in air-tight boxes, which are buried in the earth, or deposited in cellars beneath the surface. He says that the best material for the boxes or bins is sheet iron in very thin plates, galvanized, or covered with zinc, and painted on the outside with bitumen.

The principal purpose of M. Doyère's report is to give an account of five experiments on a grand scale which have been made at Paris, Alger, Cherbourg, Brest, and Toulon, from 1854 to 1861, to test this plan. The conclusion formulated in the documents is, that the wheat, in all the cases, came from the bins the same as it went in, weight for weight, quality for quality. It was preserved without deterioration, without detriment and without expense. In addition it is stated that the iron bins cost from one-half to three-fifths as much as ordinary granaries.

Nicaragua Emigration Movement.

A Company is now forming in this city for the purpose of founding a practical working colony in the Republic of Nicaragua, Central America. Mr. T. C. Leland, 614 Broadway, New York city, is Secretary of the "New York and Nicaragua Colonization Association."

Late advices from Central America state that the Nicaraguan gold mines in the department of Chontales, and near Libertad, were attracting considerable attention from American capitalists, particularly in California. It is said that the mines are very rich, and that the aid of coal and machinery alone is required to render them profitable.

Photography in the Catacombs of Paris.—M. Nadar, the photographist, has obtained permission from the municipality of Paris, to carry his apparatus down to the catacombs, where, aided by the electric light, he is photographing a series of views. By means of this magic lantern he and his assistants, now in the bowels of the harmless earth, will enable people to become familiarized with scenes which but few have witnessed.

Colt's Armory at Hartford now employs about 1,100 men; and the pay roll amounts to nearly $50,000 a month. The value of the machinery and tools in the old armory is stated at about $500,000. An additional building is now being erected, which will double the size and capacity of the establishment.

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