

**POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.**

The Association held its regular weekly meeting at its room at the Cooper Institute on Thursday evening, Dec. 18th; the President, Mr. Tillman, in the chair.

**SISAL HEMP.**

**STETSON**—The town of Sisal, on the north coast of Yucatan, gives its name to a vegetable fiber which is attracting a great deal of attention at the present time. The fiber is obtained from a species of cactus, the *Agave Americana*, and has been used heretofore principally in the manufacture of cordage. It is collected by the natives and prepared for market by a very laborious process. After bruising one of the leaves with stones, they scrape off the fleshy portion, by drawing the leaf with one hand a great many times under a scraper or comb, which is held in the other hand. A great deal of effort has been made to devise machinery for performing this labor, and at last these efforts have been crowned with success. The leaf is fed, between two fluted rollers, into the space between a swiftly-revolving drum and the inside of a cylindrical case; the drum carrying upon its periphery a number of combs which scrape the fleshy portion of the leaf from the fiber. One man can clean by hand two or three pounds of the fiber per day, while with this machine two men will clean say 500 pounds per day; and the fiber prepared by the machine is far superior to that prepared by hand, as you see, from these samples. This mat was made by the natives in Yucatan, and these bundles were prepared by the machine. This fiber has been collected heretofore in small quantities from the natives, but by the introduction of machinery the laborers will be gathered at manufactories, and this simple machine promises to effect a complete revolution in this industry, similar to the effect produced on the cotton culture by the invention of the gin. Mr. Patrullo has six machines running on his plantation, and he hires his laborers at 10 to 12 cents per day. [The machine referred to was Patrullo's, illustrated on page 353, Vol. IV., SCIENTIFIC AMERICAN (new series), improved and simplified by subsequent inventions.]

**VENTILATION.**

**MR. HYSLOP**—Mr. Chairman, in order to show the utility of my invention I will make some experiments to illustrate the principles of ventilation. I will first show that a room cannot be ventilated simply by one opening in the top. This bell glass has a large opening, as you see, in the top, and I will place it over this lighted candle. You see the candle fades for want of air and goes out. Now I will show that an opening in the top of a room and an opening in one side near the bottom, produces very imperfect ventilation. I place these two candles under the bell glass, and raise the glass a little on one side. You see that the flame just above the opening is extinguished for want of air; while the flame upon the opposite side of the glass is agitated by the incoming currents of cold air. Now I will close the opening below and place my ventilator in the orifice at the top. This ventilator consists, you see, of two concentric pipes, the inner one for the escape of the warm air extending higher than the outer one through which the cold air enters. Now I will hold this smoking paper at the mouth of the cold air pipe, and the course of the smoke will show you how evenly and gently the incoming air is distributed throughout the room.

**STEAM ENGINE VALVE.**

**MR. FISHER**—The piston valve for steam engines would be used more than it is were it not for one objection. The piston is liable to be heated more quickly than the valve cylinder, causing the piston to bind so firmly that the valve stem has been pulled apart. Mr. Davis has overcome this difficulty by inclosing the valve cylinder in a steam jacket so that the cylinder will expand as quickly as the piston; and by a plan for tightening the piston in the cylinder. [This plan of tightening would require engravings to make it intelligible.]

**BREECH-LOADING RIFLES.**

**THE PRESIDENT**—The regular subject of the evening, "Modern Improvements in Warfare," will now be taken up, and will be opened by Mr. Bartlett, who will present the Burnside rifle.

**MR. BARTLETT**—This is the rifle which was invented in 1856 by Major General Burnside. In 1857 the Secretary of War appointed a commission of military officers to examine all the breech-loading small-arms in the country with a view to the selection of the best one for use in the army. The board met at West Point and had some twenty guns submitted to their inspection, including the most famous breech-loaders in the country. They submitted them all to tests for accuracy, range, convenience of loading, liability to get out of order, and other material points, all in the thorough manner characteristic of our West Point officers. In their report they unanimously give their preference to the Burnside rifle. In 1858 a second board was appointed by the War Department, and they had about a dozen breech-loaders submitted to their examination. After trying them in the same thorough manner, this board also gave their preference unanimously to the Burnside gun. [The speaker then explained the gun, and passed it around among the crowded audience, most of whom came for the express purpose of seeing the weapon, as its exhibition had been announced in the morning papers. The Burnside rifle was fully illustrated on page 385 Vol. VII. of the SCIENTIFIC AMERICAN (new series).]

**DR. RICH**—I would like to know on what grounds this rifle is pronounced superior to all other breech-loaders?

**MR. BARTLETT**—I shall have to refer the gentleman to the military boards. To my mind the peculiar solidity of the breech is a very important advantage over any other breech-loader that I have examined. When the parts are in place the breech-piece is surrounded by thick plates of iron at the sides, and it rests against a solid wall of metal in the rear; this construction rendering the arm remarkably safe from being blown to pieces or from injuring the holder in any way.

**MR. DIBBIN**—One advantage of this gun over those breech-loaders that use a paper cartridge, is the perfect closing of the joint against any escape of gas. If the gas escapes it wears away the metal and constantly enlarges the opening. Many people seem to have an idea that a gun is valuable in proportion to the rapidity with which it can be fired, but for army use very rapid firing is of no great value. I doubt whether breech-loaders will ever come into general use for infantry.

**DR. RICH**—The opinion is becoming very general among army officers that the power to load very quickly is of the very highest value. If a soldier hurries through a long process of loading he is very likely to raise his gun and fire in the same hurried manner without any care in regard to his aim; but if he can leisurely slip his cartridge into the breech in a moment, he is more apt to spend the proper time in taking aim. The battle of Ball's Bluff was won by the rebels in consequence of their being provided with Maynard's breech-loading rifles.

**MR. STETSON**—The difference in the time required for loading a gun at the muzzle and that required for loading it at the breech is less than is generally supposed.

**DR. RICH**—Breech-loading rifles are loaded and fired without difficulty fifteen times in a minute; can any muzzle-loaders approach this?

**MR. BARTLETT**—Mr. Chairman, there is one point in relation to this rifle that I omitted to mention. In my experience in hunting deer and other game, and in shooting at targets, I have never yet found a breech-loading rifle that would carry with any accuracy. The manufacturers of this rifle claim that the bullet is so placed in the gun that its axis coincides precisely with the axis of the bore, and that it is as accurate as the very best muzzle-loader. This is the claim, whether it will turn out to be well founded or not I do not know. I have for some time regarded as one of the most interesting problems of the day the production of a breech-loading rifle that will shoot with perfect accuracy.

**DR. RICH**—I can inform the gentleman that Maynard's rifle challenges any gun, either breech or muzzle-loading for accuracy of shooting.

**MR. BARTLETT**—The Burnside Company are manufacturing at present exclusively for the army, but as soon as they are ready to put their target rifles in the market, if the challenge of which the gentleman speaks is still standing, there will probably be a very interesting trial.

**MR. PAGE**—When Sharp's rifles were first brought out we had one at Utica and tried it in competition with one of James's muzzle-loaders. We could not succeed in hitting the bull's eye with the Sharp's rifle, and finally discovered that it was owing to the fact that the bullet was not placed in the gun with the point exactly forward, and consequently, as it was sent with a whirling motion out of the gun, it wobbled wide of the mark. I believe that has been remedied, however, as well as the escape of the gases.

**DR. RICH**—In stating the challenge of the Maynard arm, I should say that it refers to rifles only that are in actual military service.

**MR. BARTLETT**—I am glad to hear this explanation, as I have never yet met with a breech-loader that could compare in accuracy with a good muzzle-loader, Clark's for instance. But the maker's of the Burnside gun claim that it is equal in accuracy of shooting to the very best muzzle-loader. The shot is placed in the cartridge by mechanism, and then the cartridge is so placed in the gun that the axis of the bullet coincides with that of the bore with mathematical precision.

**DR. RICH**—This is secured by any gun that uses a metallic cartridge case.

**MR. BARTLETT**—It is necessary not merely to employ a metallic cartridge case, but to place it in the gun so that the axis of the shot shall coincide with that of the gun, not pretty nearly, but with mathematical precision. A good rifle-shooter will not take a gun as a gift unless it carries with perfect accuracy.

**SPHERICAL CANNON.**

**MR. WIARD**—The latest experiments seem to prove that shot will pierce armor plates of greater thickness than any vessel can carry, and we must have forts for the defense of our harbors. This drawing illustrates a fort for the defense of New York harbor that would be impregnable and that would be an absolute bar to the passage of vessels. It is a conical mass of masonry surmounted by a revolving turret fourteen feet in diameter and provided with two spherical rifled cannon, each weighing 51 tons and carrying a shot of 1,000 lbs. [The details of the invention were exhibited by drawings.] The turret is revolved and the guns are turned and loaded by steam power; the engine and workmen being placed in the body of the masonry. The guns are composed of three metals so combined as to compensate for the expansion of the inner portions of the walls from heat, and thus prevent the guns from being burst by the heat.

**REVOLVING TURRETS AN AMERICAN INVENTION.**

**THE PRESIDENT**—It has been supposed that Captain Ericsson originated the revolving turret, but the truth is it is an American invention. It was first invented in this country by Mr. Vandervere; then it was invented and patented by Mr. Timby; and here is a model of a revolving fort which we have just found in the model room of the American Institute. It is marked "Caleb L. Ferris, 1846." You see that it is a perfect revolving floating turret.

The same subject in connection with that of "Inland Navigation" was selected for the next meeting, and the Association adjourned to Friday evening, Dec. 26th.

**Pea Cheese.**

There is a very close resemblance between several animal and vegetable substances. Thus animal milk contains a large quantity of caseine, which is the principal substance in cheese; and peas also contain a large amount of the same substance. The Chinese, who have exhibited such an aptitude for domestic economics, that they even make soup of birds' nests, have also found out that cheese can be made of peas. For this purpose peas are boiled into a thin paste, then passed through a sieve, and an acid added to the pea solution, which becomes curdled like sweet milk by the action of the common rennet upon the latter. The solid part is then salted, pressed in cheese molds, and it gradually acquires the taste and smell of cheese. It is sold in the streets of Canton under the name of "Taofoo," and when fresh it is a favorite article of Chinese food.

In the second half of the 15th century, Russia was but 18,000 square miles in extent. Now it covers 392,000 square miles. In 1722 the population of the empire was 14 millions; now it is 65 millions.